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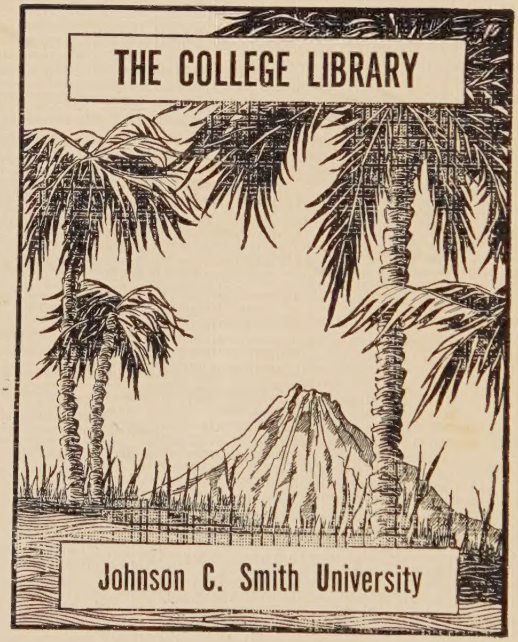

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FORMAL LOGIC

BY THE SAME AUTHOR

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A STUDY IN THE PHILOSOPHY OF HUMANISM

NEW AND REVISED EDITION 1910

STUDIES IN HUMANISM

HUMANISM

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"AXIOMS AS POSTULATES"

IN

PERSONAL IDEALISM

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PLATO OR PROTAGORAS?

BEING A CRITICAL EXAMINATION OF THE 'PROTAGORAS' SPEECH IN THE *THEÆTETUS*, WITH SOME REMARKS UPON ERROR

OXFORD: B. H. BLACKWELL
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FORMAL LOGIC

A SCIENTIFIC AND SOCIAL PROBLEM

BY

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TO THE MEMORY

OF

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WILLIAM JAMES

εἷς ἐμοὶ μύριοι ἐὰν ἄριστος ᾖ

PREFACE

FOR over two thousand years Formal Logic has been a stock subject of academic instruction. It has been established and endowed with a multitude of official defenders chosen from the ablest and acutest intelligences the human race has produced. Its subject-matter, moreover, is so far from being recondite that it should be familiar to every rational being. It professes to study an operation every one professes to perform habitually, viz. thinking, and to explain how we ought to think. It might be supposed, therefore, that by this time the subject of Logic was completely explored, that every embellishment of technicality had been added, and every logical question settled beyond a shadow of a doubt.

Instead of this, what do we find? Not only that ordinary human thinking continues to pay scant respect to Logic, but that the logicians themselves continue to differ widely as to the nature, the function, the value, and even the existence, of their science. Nor has Formal Logic, despite its establishment, ever quite been able to silence the voice of the critic. Of late criticisms have so multiplied in number and increased in severity, and that among the very professionals who seemed pledged to uphold the doctrines on which their dignity and livelihood depended, that it is hard to see how a study which labours under such imputations can be called scientific. To these criticisms Formal logicians have hardly attempted

a reply. Strong in the consciousness that they were *beati possidentes*, and that their subject, though it might be nonsense, was at any rate consecrated by a tradition of 2000 years, and that the history of education proves that nothing has a greater hold on the human mind than nonsense fortified by technicality, because the more nonsensical it is the more impervious it becomes to rational objection, the more impossible it is to amend it, and so the better it lasts, they have trusted that their traditional scheme of instruction would weather this storm, as it had survived the revolt of renascent literature against Medieval Scholasticism and the nineteenth-century revolt of science against dogma and tradition.

Nor are such calculations very far wrong. The prestige of tradition is so overwhelming, the force of habit is so insidious, that it is not at all unlikely that this whole revolt will come to nothing, and that Logic will continue to be taught on the traditional lines, unless the various criticisms that have broken down the Formal scheme in various points can be derived from some single principle, and shown to lead up to a systematic reconstruction of Logic, which will render it a more fruitful study of the procedures of human knowing.

The present work, however, is only intended to achieve the former, and intrinsically the less important, of these aims. It is an attempt to expound the traditional doctrine strictly, in its dependence on its fundamental assumption, viz. that it is possible to study the *formal truth* of thought irrespective of its truth in point of fact, and to show that this fundamental abstraction everywhere leads to failure, failure both to account for the procedures of human thinking and failure to attain even formal consistency. Thus the various defects of the Formal doctrine are all derived from the falsity of the initial principle which defines the 'science.'

I confess that to myself the discovery of the source of Logic's troubles came as a great relief. For, in common with most teachers of Formal Logic, I had found it a very difficult subject to teach without loss of self-respect. It so constantly seemed to be necessary to slur over the real difficulties to which the traditional doctrines conduct honest thinking, to palliate masses of inconsistency in what professes to be a logic of formal consistency, to refuse arbitrarily to pursue the problems raised, on the plea that they extended beyond the field of 'Logic' into 'metaphysics' or 'psychology,' and to draw the line between the 'logical' and the 'extra-logical' in a wholly illogical manner. All logicians, I believe, have felt these difficulties more or less, and seen that nothing is easier than to attack and condemn Formal Logic with its own weapons. Indeed in the details of its criticisms this book will probably be found to present little that is wholly new. What alone may claim to be something of a novelty is the diagnosis of the malady which has paralysed Logic from the beginning, and rendered it so unsatisfactory a subject of instruction, and so impotent to guide the course of human thinking. *It is* NOT *possible to abstract from the actual use of the logical material and to consider 'forms of thought' in themselves, without incurring thereby a total loss, not only of truth but also of meaning.*

The conviction that its Formal definition is what has vitiated Logic, is the positive background of what might otherwise appear a wearisome round of negative criticisms. Such criticism is, however, a necessary preliminary at present, before a study of the marvellous ways in which human minds assimilate and develop knowledge can be made to instruct and interest every one as it should. It is necessary to pull down the pseudo-science of Formal Logic, and to show what an incoherent, worthless, and literally unmeaning structure it is, before it is possible to

build up the true Logic of real reasoning which starts from the *act* of thought and so does not lose touch with Science and practical life.

It was necessary, moreover, to prove the case against Formal Logic formally and dialectically, because Formal Logic cannot profess itself insensitive to defects of form, and because at present nearly all logicians are (alas !) dialecticians.

This latter fact is curious, and largely explains the career of Formal Logic. It could never have escaped detection so long, if it had not been ranked among the 'literary' subjects. The effect was unfortunate, in that it exempted logicians from the salutary study of scientific knowing, and directed their attention upon verbal quibbles and matters of historic erudition, and rendered them slow to perceive the discrepancies between their theories and the facts, both of Science and of Life.

But Logic was also prevented thereby from doing all the harm which its false analysis of thought might otherwise have done to Science. When Science at last escaped from the clutches of medieval Scholasticism (which was itself a hybrid between theology and Formal Logic), it happened that 'Logic' remained in the *old* curriculum. So the students of Science were not taught it, and consequently were not paralysed by its technicalities and ineptitudes. They could therefore go ahead, and advance their subjects by the light of nature, without being blocked at every step by sterile subtleties. That the students of Logic continued to derive their 'mental training' from these subtleties, and that even when they were tardily taught the 'theory of Science' they were regaled with methods which neither had been, nor could be, actually used, mattered comparatively little. For in any case their lack of experience of actual research would have rendered it difficult for them to detect the futility of these methods,

and being 'literary,' they were not likely anyhow to contribute to the advancement of knowledge. So both 'Logic' and Science could academically prosper under the delightfully paradoxical regulations of, *e.g.*, Oxford, where what is supposed to be the *theory* of Science is only taught to those who know nothing of its *practice*, while those who are experts in the practice of Science are not allowed to study a 'theory of Science' which could only delay their progress.

Thus Formal Logic has survived, in spite, and largely by reason, of its falsity, and so long as it survives in examination papers its technicalities have to be taught. But they should be taught in a critical spirit, and with a minimum of pedantry and reverence for forms. It is such a critical text-book, for the use of the more progressive teachers in a most unprogressive subject, that I have tried to produce, hoping that it may be provisional, and succeed in superseding the need for its own existence. With some hesitation, I have thought it better *not* to give explicit references for the Formal doctrines discussed. It would have been easy to do so, for they are to be found (with more or less of reservation and protest) in all the text-books. But it would also have been unfair. For though there is not perhaps at present any logician who quite escapes Formalism—with the notable exception of Mr. Alfred Sidgwick, to whose original and penetrating work my extensive indebtedness would be obvious, even if I were not proud to confess it—no one takes a *consistently* Formal view of Logic. To be a consistent Formal logician is probably beyond the power of any man, psychologically as well as logically, and even the greatest Formalists do not find in their 'Logic' complete intellectual satisfaction, and may not infrequently be caught deviating from their ideal into excellent sense. Since, then, all are better than their creed, it would have been

invidious to single out a few, and too cumbrous to refer to all. And after all, when the fundamental assumptions of an old-established intellectual industry are shown to be unsound, the fear is rather that too many heads will complain that the cap fits too tightly than that too many stomachs will unobservantly assimilate such unexpectedly potent nutriment.

As regards the production of the book, my thanks are due, in the first place, to Capt. H. V. Knox, who has read it both in manuscript and in proof, compiled the index, and enriched it with many subtle and valuable suggestions. But I must thank also others of my friends for consenting to spoil their appetite for the whole by piecemeal nibbling at imperfect proofs, to wit, Mr. R. R. Marett of Exeter College, Mr. Alfred Sidgwick, Dr. H. M. Kallen, Signor Mario Calderoni, and Mr. D. L. Murray, and gratefully acknowledge the benefit I have derived from their comments.

OXFORD, *October* 1911.

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CHAPTER I

THE NATURE OF LOGIC

§ 1. *The Definition of Logic*

THE derivation of Logic from the ambiguous Greek word λογική would seem to indicate that it is a study either of words or of reasoning. And this ambiguity is significant; for it accompanies Logic throughout its whole career. It is the constant aim of Logic to deal with reasoning, and its perpetual danger to fail to deal with anything more than words, and to substitute classification of verbal distinctions for the study of actual thinking.

Logicians, however, are agreed that 'reasoning' is a complex process which involves the more elemental processes of 'thinking.' Hence their science is often defined as concerned with the nature of thinking. But this is manifestly too vague. It is necessary, therefore, to add in what way precisely Logic is concerned with thinking. This should lead to prefacing the study of Logic by a plain description of what the processes of thinking and reasoning actually are, as they occur in human life, and what are the functions they perform. But unfortunately such descriptions are regarded as belonging to Psychology, the science which aims at describing all processes of experiencing as they occur.

So it is held that Logic deals with thinking in a different way. It is not concerned with the actual occurrence of processes of thinking and reasoning, but rather with their *products*, the thoughts and reasonings

which our intelligence thereby achieves. It is interested not in the arguings, but in the arguments.

Even this distinction, however, will not suffice. For it appears that Logic does not accept *all* thoughts and reasonings without discrimination. It does not consider all thoughts to have equal *value*. It is a science which appreciates or values, and does not merely describe. In distinguishing between good thinking and bad, between right, sound, valid, and valuable reasoning and such as is wrong, foolish, perverse, and invalid, it resembles the other studies that consider values, viz. ethics, aesthetics, and, in a way, grammar. In English the best words for expressing the common nature of these sciences of valuation are probably afforded by the terms 'good' and 'bad.' For these seem to be the terms which imply relation to a purpose. The 'good' is *good for* an end; the 'bad' is what defeats or thwarts a purpose. There are, however, special names for the good and bad in the several sciences of valuation. In morals the good and bad is called *right* and *wrong*, in art *beautiful* and *ugly*. The special terms proper to the study of thought are *true* and *false*, *truth* and *error*. But just because these sciences are all akin, it is common in most languages to transfer metaphorically the proper terms of each science to the others. We not only speak of a *good* argument but of a *beautiful* proof, and call reasoning *wrong* as well as *false* or *bad*, and conversely we can speak of *true* and *false* art, or friends.

The fundamental interest of Logic, therefore, is in the truth or value of thinking; the fundamental distinction in logical value is between the true and the false.

But this very distinction implies that not all thinking or reasoning yields products which are 'true.' If it did, there would be little need for Logic. If we could no more help thinking and reasoning rightly or truly than we can help gravitating according to Newton's law, and if error were equally valuable and desirable with truth, there would be no need of teaching us to think rightly, and the theory of thought would be as simply descriptive as that of gravitation.

It is therefore the fact that truth is mixed with error, that the true has everywhere to be distinguished from the false, that determines the nature of Logic as a science of values or *norms*. It is also what renders it practically important and theoretically difficult. The former because it is a great human interest to discover truth and to avoid error; the latter because Logic cannot satisfy us by giving a theory of thinking in general but must aim at distinguishing true thinking from false. This aim, however, will be found to involve it in complications from which it can extricate itself only by a radical reform of its traditional procedure.

§ 2. *Form and Matter of Thought*

Of these ulterior difficulties, however, the traditional Logic is blissfully unconscious. But it proceeds to notice others. If its function is to give an account of true thinking, is it not thereby committed to lay claim to all truth and universal knowledge? Must it not profess to discern truth and to correct error in all the sciences? Yet a pretension which would make Logic coextensive with science could only seriously be entertained in the Middle Ages.[1]

Logicians, therefore, hasten to disclaim so embarrassing an ambition. They explain that their science deals only with *formal* and not with *material* truth, and that the formal value of a reasoning may be judged without possessing competence about the material facts. When asked to explain further what they mean by form and matter, they allude to the familiar fact that the shape of things and the stuff thereof may vary without affecting each other. Different stuffs may take the same shape, and the same stuff may be taken for different shapes. A medal may be struck in gold, silver, copper, etc., and each of these metals may be moulded into the most various forms. Why should not the case of thought, therefore,

[1] And in the University of Oxford. The writer, *e.g.*, is a Doctor of Science, because originally 'Science' in Oxford meant Logic.

be analogous? The brilliant idea naturally occurred to logicians. If their science could study the forms of thought and treat the matter as irrelevant, they could sit in judgment on the sciences. They could criticize all knowledge, without producing, or even acquiring, any. Only, it is true, in respect of its form. But was any human knowledge ever formally perfect? Or again, could any material knowledge vie with the absolute validity of formal truth? A glorious career seemed to be opened out to the logician. He became the infallible judge of the formal value of an argument in any science, and he could claim to produce necessary truth which no rational being could dispute, provided only that the plodding workers at the dull details of the sciences kept him properly supplied with propositions that were true in matter and in point of fact.

This last proviso was passed over lightly as a matter of course, heedless of the fact that the detection and accumulation of 'material' truth forms the whole work of every science, and that any failure or defect in the supply of material truths vitiates and frustrates all the formal inferences drawn by Logic. The full scope of this problem Logic has been singularly slow to realize.

§ 3. *The Difficulties of Formal Logic*

It could hardly avoid, however, recognizing two fundamental difficulties. (1) Formal distinctions soon showed a distressing tendency to become verbal, and formal Logic was continually tempted to degenerate into verbal trifling that never penetrated to the real problems of science.[1] The source of this fiasco, however, the Formal[2] logician

[1] It is pathetic to note how each successive logician brings against his predecessors the same charges of acquiescence in illusions and incapacity to attain real truth, which were subsequently to be brought against his own logical method. Plato condemns the logic of the Sophists as a sham, Aristotle convicts the 'Dialectic' of Plato of formal inability to yield a demonstration, Bacon denounces the sterility of Aristotle's 'apodictic' demonstration, Mill deplores the inadequacy of Baconian induction, Mill's critics show that his induction is as formal and as futile as the rest of the tradition. It is clear, therefore, that the root of the trouble is very deep-seated.

[2] I shall follow Dr. Boyce Gibson's *Problem of Logic* (p. 6) in distinguishing between 'Formal' and 'formal.' 'Formal' will refer to the view of the actual

could never discover. For it lay in the erroneousness of his original assumption that the actual process of thought could be put aside as psychological and irrelevant to its evaluation. By thus abstracting from the meaning of assertions *as made*, he unwittingly abstracted from real meaning altogether. That is, he condemned himself to consider only *forms of words*, which, though potentially significant, were no longer actually asserted. He thereby necessarily blinded himself to the facts that the same meaning can be conveyed in many different forms and that the same form can be utilized for conveying many different meanings. It is never possible, therefore, to argue without a risk from the meaning of the words to the meaning of the man who used them, or to assume that because the man had a certain meaning to convey he must employ a particular form of words. The result was a complete divorce between the form and the meaning, by which the form was reduced to verbality.

(2) The second difficulty was perceived by the more discerning, and admitted by the more candid, among the logicians themselves. It appeared that Form and Matter could not in the end be wholly separated; certain forms were appropriate to certain matter, certain meanings were expressed more naturally in one form than in another. It could not be maintained, therefore, that the material of thought exercised no influence at all upon the form, and could be disregarded by Logic altogether; it had to be admitted that the forms of thought were diversely modified according to the various matters thought about.

But even then logicians did not see either that this was to give up the notion of Formal truth in principle and to raise the problem of how the 'matter' determined the 'form,' or that their admissions should have carried them much farther than they wished to go. They did not see that ultimately in every case of actual thinking the question involved was bound to be that of expressing a *particular* meaning, and that therefore the form

forms to which Formal Logic stands committed by its abstraction from 'material' truth.

employed had to be relative to a particular purpose. Hence it was always necessary to analyse the 'matter' in order to discover the real (as opposed to the verbal) form. The material nature of truth asserted, therefore, not only always had a general influence on the form, and could not be abstracted from, but it determined the choice of the form actually employed.

§ 4. *The Failure of Formal Logic*

Still less did logicians realize the fundamental falsity of the assumption that the existence of material truth might be taken for granted, and need not form a subject for logical investigation (§ 2 *s.f.*). The importance of this oversight will appear in the sequel. We shall see at every step in our progress through the traditional 'Logic' that so long as Logic puts aside this problem of material truth it can neither attain to a logic of Science, nor yet clear its doctrines of constant lapses into contradiction and inanity, and cannot become itself a real science at all. For it must decline to undertake any real study of actual thought, and content itself with formulas which are unapplied and probably inapplicable.

So important is this point that we must class together under the head of Formal Logic all views, however conscious they may be of the defects of other formal views, which take material truth for granted as a datum and decline to consider how real truth is determined. We shall thereupon find (1) that *all* the traditional logics are extensively infected with Formalism in the sense of this definition; (2) that for this very reason they are incurably inconsistent; (3) that their doctrines only become intelligible (and sometimes tenable) when reconsidered in the light of the view that the distinction between truth and error is *not* irrelevant to Logic, but is the very core of its being.

The first of these statements will receive such abundant illustration in the sequel that it need not be dwelt on here; but the proof that any logic which declines

to consider the question of the real truth of the reasonings it attempts to deal with necessarily condemns itself to utter formality is easily given, and very instructive. It is a *formal* characteristic of *every* assertion that it *claims truth*, absolutely and without reservation or suggestion of fallibility. Hence it follows both if (*a*) the question of the actual value of this claim is ruled out of order, and if (*b*) the assertion is accepted at its own estimation, that the distinction between true and false must, in fact though not in name, disappear from Logic. For all assertions will be held true because they formally claim truth; because none profess to be false, error no longer exists—for Logic. Thus the logical form of an assertion affords no means of deciding upon the real value of its claim to truth, and hence any logic which restricts itself to the study of this form inevitably accepts a truth-claim as the equivalent of real truth. It is like a bank which does not distinguish between promises to pay and hard cash.

Now in a sense this is a simplification. It renders invisible the existence of falsity and error. It rules out the difficult and complex problem of how in point of fact truths are established and errors corrected. But it pays a price for these advantages which should be prohibitive. (1) It involves a radical departure from the ordinary meaning of truth. For the 'truth' which it considers is not one which is opposed to and exclusive of error, but one which has amiably concluded a truce with error and been reconciled to falsity. Formal claims to truth are indiscriminately true and false, but Formal Logic makes no attempt to sift them. Its 'truth' therefore is something radically different from what truth means in science and in ordinary life.

(2) As a way of getting rid of the problem of error and falsity the expedient seems extremely naïve. Error and falsity hardly seem to cease to exist, to ravage the intellectual world and to require to be dealt with, merely because a formal fiction forbids Logic to recognize them. And if it is really true that Logic is compelled to make this abstraction, what this would prove would be not

the non-existence of error, but the useless artificiality of the Formal point of view.

§ 5. *A Logic to discriminate between True and False wanted*

(3) The proper inference, therefore, from the situation, as Formal Logic has conceived it, is not that we should acquiesce in its impotence, but that we should earnestly cast about for a further discipline, which, whether decorated with the traditional title of Logic or not, will consent to consider the problem of real truth and show itself capable of conceiving truth in a way that does *not* confound together true and false. We need, in short, a second Logic which will be applicable to life and relevant to actual thought. For in real life the distinction between true and false is always present to consciousness, and to discriminate between the true and the false is one of our most pressing and vital concerns. Nor can it be contended, short of the completest scepticism, that this discrimination is never effected. It must be possible, therefore, to formulate a theory of what is actually practised. A logic of real truth must, therefore, be possible. But once it is constructed, it must supersede Formal Logic and condemn it to unutterable triviality.

§ 6. *The Self-contradiction of Formal Logic*

(4) Formal Logic is not only incapacitated by its self-imposed limitations from dealing with the problems of actual thinking and from rationally interpreting the conception of truth implied in such thinking; it is at the same time incapable of dispensing with this notion. Hence its whole doctrine here rests upon an avowed and formal self-contradiction.

In other words, to delimit the field of Logic and to disentangle the nature of logical assertion from various psychological processes with which it is bound up in its actual occurrence, it is necessary to have recourse to the

conception of truth which has been disclaimed. In actual fact logical assertion grows up in the jungle of wishes, desires, emotions, questions, commands, imaginations, hopes and fears, which constitutes the psychic life of every living person. In real life logical assertion is intimately bound up with this context; it is either the answer to or the raising of a question, and so an integral part of a larger process. Hence it can be extricated and contemplated apart only by a forcible abstraction. The instrument by which this extrication is effected, the criterion by which the subject-matter of Logic is defined, is the very conception of truth which Formal Logic subsequently shows itself so unable to handle. For logical assertion is defined as that product of a thought which can be *true or false*, and thereby distinguished from questions, wishes, commands, and the mere play of imagination in which nothing is affirmed. To none of these other incidents in concrete thinking can the predicates true and false be properly applied. They can be said to belong, therefore, to the psychical concomitants of thinking and banished from Logic.

There is something to be said for this doctrine on the score of convenience. But for the purposes of Formal Logic it is open to the fatal objection that it is wholly inconsistent with the position it has already taken up on the subject of formal truth. For to distinguish logical assertion as true-or-false implies a conception of truth which discriminates between them in a way formal truth-claim cannot do.

Moreover, the attempt thus to abstract logical assertion from its natural context inevitably breaks down. In actual knowing the forces which generate the assertion and determine its actual meaning reside in the psychical context. It came as an answer to, or an occasion for, a question. Or it was a thought to which, wittingly or unwittingly, legitimately or illegitimately, a wish was father. Or it was subtly prompted and coloured by emotions which were all the more dangerous and insidious because our official Logic had ignored their existence, and we were neither aware

of their potency nor of their charm. Or it expressed, or followed from, one of those imperatives which we address to nature at the prompting of our wishes, and gradually succeed in getting confirmed by the complaisance of nature, until our postulates grow into axioms and become great principles for setting our experience in order *a priori*,[1] and their humble origin in human wishes is ignored. Or, lastly, it may even have been suggested by sheer play of imagination, which is often a fertile means of stumbling upon truths.

Clearly, therefore, if such was the original meaning of the assertion, it must be wholly transformed or destroyed when it is violently severed from its context. For it has its roots in these things, and unless they are adequately known, no one can tell what is the logical meaning it actually intends when it is made. Sever it from the sources of its meaning in the personality of its assertor, and every guarantee that it means what it meant *in situ*, or that any one still means to assert it, disappears. The only meaning left to it is the *meaning of the words*, *i.e.* the usual or average meaning in which the words that expressed the actual meaning are commonly employed. But there is no evidence that this coincides with the actual meaning, and a strong probability that it does not express the whole of it. Hence the Formal view is restricted to the meaning of the words, and purchases exemption from the psychology of individual minds by a plunge into verbalism. The alternative of *either* a recognition of personal human thinking *or* a contented lapse into mere verbality forms the Scylla and Charybdis between which Formal Logic vainly tries to pass, and we shall throughout have occasion to note the recurrence of its failures.

Similarly the contradiction that it both cannot, and yet must, use a conception of truth which excludes error reappears in the logical definition of Judgment. For it is both the earliest and still the simplest of the defini-

[1] A word which is either ambiguous or unmeaning to such an extent that its continued use constitutes a serious reflection on the honesty of philosophers.

tions of this central logical function, first enunciated by Aristotle himself, and frequently repeated since, that Judgment is that which is either true or false. Now this is clearly *not* a Formal definition because, as we saw, the formal claim of Judgment is always to be 'true.' Either, therefore, this definition of Judgment, or the abstraction from real truth and actual thinking which Formal Logic perpetrates, must be abandoned. That a revision of its initial abstractions is the proper policy for Logic to pursue is the alternative which has probably already suggested itself to the reader. But it is not part of the design of this inquiry to show that this easy alternative is rational, practicable, and profitable. Its aim is only to show that the alternative preferred by Formal Logic leads everywhere to self-contradictions and absurdities, which can only be cleared away if the attempt in Logic to abstract from actual thinking, to ignore personality, to dehumanize thought, is renounced sincerely, systematically, and finally, at the beginning.

CHAPTER II

TERMS

§ 1. *Terms as Abstractions from Judgments*

TRADITIONALLY the logical analysis of thought is (like Caesarian Gaul) divided into three parts, entitled the doctrine of the *Term*, the *Proposition*, and the *Syllogism*. This is the nomenclature best suited to the essentially verbal character of the analysis, but when logicians attempt to distinguish the process of thought from its expression in words, and to show themselves conscious of the dangers of verbalism, they often prefer the terms, *Concept* or *Universal*, *Judgment* and *Inference*. The difference is not important, because, on the assumptions of Formal Logic as it stands, the actual processes of thought can never be analysed, and because in either case the same difficulties present themselves.

(1) It is soon seen that no real act of thought can correspond to the logical division entitled Term or Concept. A Proposition or Judgment is the simplest product of thought that can claim to be true, the minimum vehicle of truth (or falsity). If I say 'The air is hot,' I assert what may be true or false. But if I subdivide the verbal vehicles of this assertion into the 'terms' 'air' (the *subject*) and 'hot' (the *predicate*) and conceive them as put together by the *copula* 'is,' neither term continues to convey any assertion. I may utter the words aloud, but I neither affirm nor deny anything, and convey no meaning. If my hearers are familiar with the words and take for granted that I am trying to use them to

convey a meaning, I shall at most provoke the question, 'Well, what about the air and hot?' The terms therefore carry meaning, and are subjects for logical study, only *in* the proposition, and any analysis which destroys its integrity reduces them to mere words. The very word 'term' indicates that it is only the terminal point of a proposition. Similarly in the case of the Concept. Concepts live only in judgments. They are not really thought unless they are affirmed or denied. Where there is neither affirmation nor denial, there is no thinking, but either such 'extra-logical' mental process as wishing, questioning, etc. (cp. Chap. I, § 6), or a mere contemplation or succession of mental images, which mean nothing until they are *used* in a judgment.[1] It would seem, therefore, that by its own definition of its subject Formal Logic was bound to begin with the doctrine of the Proposition or Judgment and regard that of the Term as illusory or verbal.

(2) It may also be contended that not only should Formal Logic begin with the Judgment, but that it should also stop there, because it cannot embark on inquiries about connexions of propositions or judgments without further assumptions which it has itself ruled out. For at a first view the possibilities of connecting and combining judgments seem to be unlimited. Any proposition may serve as a point of departure in any direction: from it we can ultimately argue to any other in the world of knowledge. What, then, determines that the course of thought should actually proceed in one direction rather than another? Having judged 'the air is hot,' why proceed 'then I will stop at home,' or 'you had better not go out,' rather than 'but it does not

[1] The mental attitude called 'supposal' or 'entertaining an idea,' which is sometimes thought to precede judgment, would seem to be really complex and posterior to judgment. It consists in first forming various judgments about the same subject, and then *playing* with them, without definitely accepting or rejecting any of them. This play is no doubt anterior to the final decision to which it should lead up, but this does not alter the fact that the play implies the power of judging. The judgments are made hypothetically, *i.e.* made and then inhibited, instead of being seriously used. The process belongs, like other phases of doubt, hesitation, and inquiry, to the psychology of the knowing mind.

matter,' or 'then the grapes will ripen,' or 'oh, for the seaside breezes!'? All these thoughts might reasonably enter one's mind—why, then, should some of them be treated as logical inferences and the rest ignored? Why is Formal Logic so confident that the sole proper and natural inference is—'Some hot things are air'?

Formal Logic has no answer to these questions. It does not appear that it has anywhere or at any time considered the vital problem of how the passage from one judgment to another is ever effected at all. All it can say is that from time immemorial it has, as a matter of course, manipulated propositions in certain peculiar ways and called them 'valid inferences.' But that these ways are only a few out of many it does not seem to be aware, nor yet that in actual thinking every way is determined by the special interest of the manipulator, and that to abstract from these special interests is to render the whole advance of thought unintelligible. It ignores the whole topic of interest altogether, and so is saved from the discovery of what a petty and narrow interest it is that supports its own procedure. Whenever an attempt is made to point out that in every step in actual thinking a person intervenes and directs the course of thought in accordance with his interests and ideas, and that therefore to understand the sequence and connexion of thought this fact must be taken into account, the cry is raised that this is psychology, and an attack upon the dignity and integrity of logic. It may be so, but it does not follow that the fact can therefore be disregarded. It may be that the sole alternative to a logic which comes to terms with psychology is one which is enslaved by grammar.[1] It may only follow that the existing borderline between psychology and logic is inconvenient and indefensible, and should be drawn differently. And the sooner Formal Logic realizes that it will have to pay the penalty for its false abstractions in the reduction of its own pet doctrines to absurdity, the better it will be for the study of human thought.

[1] Cf. H. V. Knox in the *Quarterly Review*, No. 419, pp. 402-4.

§ 2. *Terms as Convenient Fictions*

However, instead of reconsidering and amending its assumptions, Formal Logic defends its practice by a series of lame excuses.

(1) It meets the objection to the logical status of Terms by an apparently frank appeal to expediency. It is *convenient* to treat terms *as if* they could exist independently of the proposition, and possess meaning in themselves. Nay, it is also consonant with common-sense. For do we not currently speak of the meanings of words, and compile dictionaries to contain them? Why, then, should we not indulge in logical classifications of terms taken out of their logical context? Similarly, though it is doubtless true that, strictly, concepts function as such only when actually used and thought about, yet are there not objects of thought which are constantly thought about, and so become far more permanent, and, as it were, more solid, than the fleeting thoughts which generate them? And do they not deserve to be recognized by name as Concepts or (better) Universals?

In this defence several points demand comment. It contains the first avowal by Formal Logic of its use of the principle of scientific fiction. Now this principle may be said to be legitimate, because all the sciences have in the first instance to adopt whatever principles they can find on 'methodological' grounds, *i.e.* because they suggest methods of working; and they may continue to find them useful long after they have discovered them not to be strictly true. But no science probably makes so extensive and shameless a use of methodological fictions as Formal Logic. It is so largely constructed out of them that it has incurred the gibe (which in Oxford is traditionally fathered upon Jowett) that Logic is neither a science nor an art, but a dodge. Even this protest might be passed off with a laugh if the logical use of its fictions were actually successful. But we shall find abundant reasons for disputing this. The double charge against the fictions, assumptions, and abstractions

of Formal Logic is that they both ignore the purpose which a scientific Logic ought to set before itself, that of understanding human thought, and also defeat the aim of Formal Logic itself, that of compiling a consistent and self-contained structure of formal doctrine.

§ 3. *Terms as Dictionary-Meanings*

(2) That logical terms appeal to the meaning of the word is significant and instructive. For it bears out what has already been suspected as to the tendency of Formal Logic to become verbal. Indeed, in its practice the meaning of the term is just the meaning of the word, and it is precisely the existence of dictionaries which suggests and facilitates the 'logical' treatment of 'terms.' To clear up, therefore, the whole mystery of Formal meaning we have merely to examine the current notion of the meaning of words.

It will probably be conceded that the meanings of words are not original but acquired; *i.e.* that there is nothing in the nature of an articulate sound, like *e.g.* 'key,' that compels all men to use it to mean what it does in English and not what it means in French. A little reflection, therefore, shows that the meaning of the word must have arisen out of the use of the sound by persons who managed to convey their meaning thereby.

Clearly, also, while this process was going on the meaning of the word could not be taken as fixed; whence it follows that it is never, theoretically, quite fixed, so long as the word continues to be used. For some one may always contrive to extend or restrict or transfer or vary its meaning by the way he uses it, if he can persuade others to follow his usage. Because a word is essentially an instrument for the conveying of meaning, it is always in a measure pliant. It acquires its meaning or its meanings (for in time it is sure to grow more than one, even for dictionary purposes) in the service of man, and must always be prepared to take on new shades of meaning in that service.

And conversely, if we consider the problem of conveying a meaning, we find that it always arises in a definite situation, for definite persons. The question is always—how can a particular meaning be conveyed, and what resources does a language contain to convey it? It is thus the desire to communicate meaning which dictates the choice of the words used, and ultimately controls their meaning. For the original compilers of dictionaries get the word's meanings from an examination of the passages in which it has been used in print. Nevertheless the meaning (or meanings) as formulated in a dictionary never can be an absolute and infallible guide to actual usage. It represents merely the *average* meaning, with which the word has been used in the past, and the probable meaning, with which it will be used in the future; but it cannot prohibit its modification. To understand any particular sentence, we may have (as every schoolboy translator has painfully to discover) to go beyond anything we find in our dictionaries, and in any case we have to select the 'right' meaning from those given, and to adjust their dicta to our special problem. No critic of a bad translation would allow the excuse that the wrong meanings given to the mistranslated words had been found in a dictionary.

Now what is the bearing of this on the logical doctrine of meaning? Clearly it follows that if the meaning of terms is nothing but the dictionary-meaning of the words, it cannot be trusted to give us the actual *meaning-in-use* of any proposition. We ought always to go behind it to what its assertor is actually trying to express. This actual meaning should never be ignored and sacrificed to the meaning of the term in abstraction. For the latter is not actual meaning at all. It is only potential meaning —at best a rough guide to the real meaning, to detect which we must always use our intelligence. But this result bodes ill for the value of the Formal classifications of terms which we shall have to consider (§§ 5-10). We must expect to find in them dangerous snares, because they fix our attention upon the trivial and unimportant

differences which would hardly deceive a child, and distract it from the real problem of meaning. And moreover they cannot ultimately stand really scientific treatment. For the Formal treatment of terms blinds itself to the real logical meaning by systematically ignoring the problem of the application of the potential dictionary-meaning to the actual case of the use of the term. What it actually tries to grasp is an elusive phantom compounded out of an unattainable ideal and a verbal husk.

§ 4. *The Verbality of Terms*

(3) In the notions of permanent concepts and objects there lurk similar dangers. 'Concepts' and 'objects' are generated in an entirely analogous way, viz. by people thinking about them, and they persist by becoming objects of sustained personal interest. But this hardly seems to explain the enormous *rôle* they play in human life. They seem to be vastly more than words for ways of habitual behaviour. It is hard to realize that 'money' is only a something whereby a vast number of exchanges are daily effected, that 'reason' is only a collective term for multitudinous processes of reasoning, or that 'poetry' would vanish from the world if men ceased to take up a certain attitude towards life. And so all such objects of thought should probably be subjected to a severe discount. It should not be assumed that because a thing is called an 'object of thought' it is actually thought about—any more than a word has an actual meaning simply because it is in a dictionary, or an author is read because he is mentioned as a 'classic' in a history of literature. What is the real object of thought must be determined by reference to the particular case; it can never safely be decided by knowing about objects of thought in general.

It cannot, therefore, be allowed that Formal Logic does well to take terms out of their context in the actual judgment. Its procedure debars it from determining the actual meaning of thought, and confines it to the potential

meanings of forms of words. This procedure is wrong in principle, and how unsatisfactory it is in detail will appear when we examine the Formal classifications of terms which are commonly enumerated. Not one of them turns out to have any scientific value as a guide to the nature of thought; all of them of necessity reduce themselves to *verbal* distinctions.

§ 5. (i) *Subject and Predicate*

The first of these Formal distinctions is that resulting from the logical analysis of judgments into Subject, Predicate, and Copula, which has already been mentioned. To be scientifically intelligible this analysis should be conceived to rest on psychological observations that in a situation which evokes thought one feature is commonly singled out as the problematic 'thing' about which affirmations (or denials) require to be made, by means of the previous knowledge which is attached to (or detached from) this 'subject' and is then said to be predicated of it. Thus the predicate and the copula together represent an ideal experiment or operation performed on the subject, and an adequate psychological description of what the judgment means implies, of course, a knowledge of the particular situation in which it occurs.

But so soon as the study of the act of judging is renounced, the judgment becomes a form of words, and the *indicative sentence* takes the place of the real judgment. It makes a very poor representative, which soon convinces the logician that the forms of language are very inadequate to the expression of thought. A meaning may be conveyed in a single word—*θάλαττα* may mean 'there is the sea!' and 'villain' 'you are a villain.' Predicate and copula may fuse together, and the very language may protest against the pedantry of analysing 'he runs' into 'he is running.' The subject may verbally disappear ('cogito,' 'currit,' etc.), or the verbal subject may not be the real one ('nothing endures'). None of the complications with which the idiosyncrasies of language thus

encumber Formal Logic would demand a mention if it had not chosen to adopt the study of words as a short cut to that of thought, nor would it continue to seem a logical question whether a word can be used as a term by itself or only along with others, and so is to be called *categorematic* or *syncategorematic.*

§ 6. (ii) *Abstract and Concrete Terms*

The next distinction it is important to notice is the division of Terms into *abstract* and *concrete.* A concrete term, it is said, is the name of a person or thing, an abstract term that of a quality or attribute. These definitions are open to a number of objections which raise the profoundest philosophic issues, and indeed will probably result in the conviction that the attempted distinction is very ambiguous, wholly unscientific, and in the end merely verbal.

(1) In the first place we may ask, how is it possible that the *name* of a person or thing should be concrete? A thing is called concrete because in the metaphysics of Aristotle it was somehow composed (in a way Aristotle never succeeded in specifying) out of a union of Form (εἶδος) and Matter (ὕλη). As such it was fundamentally opposed to the concept. For the concept is universal and pervasive of a multitude of things; whereas each real concrete thing is unique, and no two which are wholly alike are ever found.

But it is one thing to call a thing concrete, and quite another to call its name so. The name never seems to participate in the thing's uniqueness. If we take the concretest term imaginable, the *Proper Name*, what do we find? A Proper Name is, of course, intended to be the name of the particular real thing to which it is applied. What its use means is that the peculiarities of the thing bulk so large in our eyes, that its differences from other things of its kind seem so important, that we need to set apart a special word for its service. It is not itself more unique than the rest of real things which have no Proper Names; but

these we can handle in the mass. So it suffices to give them names which designate their *kinds*, and are consequently called *Common Terms*. We are sufficiently interested in our children, our dogs, our horses, our mountains, our rivers, and (in a fighting age) our swords ('Excalibur'), to bestow upon them Proper Names; but we do not usually take the trouble to decorate similarly our sheep, our boots, and our toothpicks, and when things are as like as two peas we judge that their individual differences may for ordinary purposes be ignored.

Now in its actual use the Proper Name is as unique as the thing it designates, if it is successful as a vehicle of meaning. The name 'Tom Jones' means a particular individual and no other, if it conveys to others the meaning that is intended. If you fail to understand *which* 'Tom Jones' I mean, there is to that extent a failure in the function of the name. But this does not alter the fact that I mean that particular Tom Jones.

This uniqueness, however, appears to reside in the *application* of the name to the unique individual, and *not* in the name *per se*. You might give the name to an indefinite number of puppies, kittens, or Welshmen. There is nothing about the name itself to prevent it from being appropriated to any being deemed worthy of distinction by a Proper Name. The words themselves are equally applicable to an infinite class of potential bearers of the name.

Hence it follows (*a*) that, taken in abstraction from the application or use, the Proper Name is quite abstract, and not at all concrete or unique; and (*b*) that it at once becomes concrete when used.

(2) But the same thing would appear to be true of the 'Common Terms,' which are the names of kinds. The term 'cat' is taken to be less concrete than 'Tom,' because it is applicable indifferently to any number of individuals of a kind; it seems to contain no suggestion of an unique individuality like the Proper Name.

But this is only because the term is taken in its 'dictionary' sense and in abstraction from its actual

meaning. When it actually conveys meaning, *i.e.* when it is applied and used, it becomes fully concrete. It makes no difference, *e.g.*, whether you do not know the personal name of a cat and address it politely as 'Puss,' or knowing the same, can call it 'Tom'; you mean the same cat in both cases.

(3) This suggests a further inquiry as to whether the case of the so-called 'abstract' names is really so different. When there is a real question about an abstract term like 'wealth' or 'happiness,' it is never the quality *per se* that is debated. In the actual use of the term the quality is always conceived as inhering in and exemplified by some real object. When people talk at large about abstractions and ask 'What is Love?' and 'What is Truth?' the reason why so little usually comes of it is that they tend to forget this, and lose sight of the concrete facts to which their terms apply, so that the discussion has really lost its meaning.

'Abstract' terms, therefore, when properly understood and really successful in conveying meaning, are as concrete as any other. They too refer to, and indicate, features in the unique succession of real events. They are abstract only in their *dictionary* sense, as the 'meaning of words'; but in this sense all terms, even Proper Names, are abstract and their meaning is only potential (cf. p. 24).

(4) What, then, is the real difference between the terms called 'abstract' and 'concrete'? It is a difference in use. We have seen that there are beings in the world whose claims on our attention are so insistent that it is convenient to bestow upon them Proper Names, in addition to the Common Terms which will do for the masses of objects. Both these classes of beings are capable of presenting themselves as objects of perception and are recognized as realities in their own right by the common-sense view of the world. But for many of the purposes of life the merely perceptual analysis of experience does not suffice. We have not only to recognize things, but also their qualities. For by recognizing the 'same' qualities in different things, and different qualities

in the same thing, we can forecast their behaviour far better, and adjust our own to the course of events.

Hence the analysis of experience has to be carried further. We must single out the 'abstract' qualities, which do not actually exist save *in* the things, as distinct (or 'independent') objects of thought. Thus 'concrete' terms are devised for use upon the objects of perception as they present themselves, while 'abstract' terms involve a further analysis of these same objects.

(5) Nevertheless there is a further sense in which *all* terms may be regarded as abstract, *i.e.* as arising through a process of abstraction.

For the common-sense analysis of experience into the interactions of things possessing various qualities, though it is now the point from which all philosophic reflection must originally start, does not ultimately turn out to have been the primary condition of our experience. It is an achievement, probably the greatest philosophic feat of the human race, and so valuable that it has become common property (Chap. XX, § 3).

But it was not thus that the world first presented itself to the nascent mind. Reflective self-examination shows that before every act of thought there is present to the mind far more than it is desirous of grasping, capable of focussing, or interested in communicating. It has therefore to *select* what is important and relevant from a mass of irrelevant context, by concentrating attention upon it and excluding the rest. It is necessary therefore to *abstract*, to free the points of interest which we wish to think about, from their entanglement in the irrelevance that chokes them, to reject as well as to select, to ignore and to *abstract from* the latter. Being selective, this process may be called (in a sense) *arbitrary* and is certainly risky; for we may err in what we select as relevant to the purpose of our thinking, and so retain what is irrelevant and reject what turns out to have been relevant.

But just because in this sense *all* thinking is 'abstract,' no distinction between abstract and concrete terms is feasible. 'Abstraction' becomes the condition of all

effective exercise of thought. Without it we should continue to be tossed about in a confused chaos of impressions and never emerge into the perception of definite objects or the possession of an orderly experience. But to recognize the general necessity for abstraction of this kind decides nothing, of course, as to the particular sort of abstraction to be used in any subject. It does not sanction, for example, the abstractions of Formal Logic, nor compel us to approve of the Formal division of terms into 'abstract' and 'concrete.' For it is an essential feature in this Formal treatment of terms that among the points abstracted from is their relation to a particular context, their application to a particular case. Once this is done, they all become abstract in the sense that their meaning becomes potential and conjectural. Even the most 'concrete,' even Proper Names, cease, as we saw (p. 21), to be names of particular objects and become names for classes of things. Not that, however, this should be regarded as a defect. For we want our names to be general and capable of an indefinitely extended use. It would be very inconvenient, *e.g.*, if the fact that some one had once been called 'Tom Jones' debarred every one else from bearing this illustrious name for ever afterwards. But it is clear that neither this paradox nor any of the others which beset the distinction can be cleared up so long as logic considers itself debarred from distinguishing between the verbal and the actual meaning of terms.

§ 7. (iii) *Common, Singular, and Collective Terms*

We proceed to a distinction, which we have already anticipated in part, between terms *common* (or *general*) and *singular*. A general term is defined as one which may be used of any number of individuals of a kind in the same sense; a singular term as one which is meant to apply only to one individual in the same sense. Thus the Proper Name is one kind of singular term, though a singular term is not necessarily a Proper Name. 'The

Pope' and 'the King' are singular terms ('designations') but the Proper Names of the persons so designated are 'Pius X' and 'George V.'

The practical reason for these distinctions of speech has already been explained, and is indeed fairly obvious. But Formal Logic errs in asserting that general terms are used of individuals in quite the same sense. *E.g.*, if I call two cats, whose names I do not know, both 'Puss,' I do *not* mean 'puss' in quite the same sense in both cases. Indeed, if the wrong puss responded to the call, I might say, 'No, I did not mean you, puss,' and tell her to go away. This shows that the general term is not strictly common; it applies to the different specimens of the kind in an individually specified manner, and does *not* mean that we are unaware of the differences between them. Of course, when the application (use) is abstracted from, these differences vanish, and the term becomes *abstractly common*, i.e. *applicable*. But this neither means that no differences exist between individuals, nor that we do not see them. Only, when we use a common term, we usually mean that these differences are irrelevant and that the individuals may for our purpose be grouped together. Thus our purpose constitutes the bond which renders the common term applicable to particular cases. Hence if the Formal definition is to be preserved, it should at least be explained that 'the same' should not in logic be taken to mean more than 'equivalent for a purpose.'

(iv) We may not only require to conceive individuals as members of a class or kind, but also to refer to them in their groupings. For this purpose we have devised what Logic calls *collective* terms. The term 'army' enables us to mean an assemblage of soldiers, the term 'Parliament' the collective product of the nation's political wisdom, the term 'truth' the body of truths, etc. But here again it is the use that affords the only real clue to the meaning, and from the abstractly Formal standpoint 'collective' terms cannot be distinguished from 'general.' For the same word may be used as either, and is sometimes collective, sometimes general. Every collection of

individuals may be viewed as a case of other similar collections; and so when we compare the different 'armies,' we no longer use the term collectively, but *distributively*, as a general term.

§ 8. (v) *Ambiguity and Equivocation of Terms*

It has already had to be pointed out that the same words are frequently used in various senses, and the complexities and confusions which this practice introduces into philosophic terminology are probably chief among the obstacles which strike, and impede, the student of philosophy. At the same time, it must not be imagined that the language of ordinary life is free from ambiguities. Indeed it is full of them, and they usually escape both notice and censure. So it should be one of the chief benefits derived from the study of Logic to open the eyes of the soul to the all-pervasiveness of ambiguity.

But it may be doubted whether Formal Logic has not the very opposite effect. By restricting itself to 'forms' it selects a subject-matter which is necessarily verbal and 'ambiguous.' For 'forms' are forms for meaning, and may be used to convey very different meanings. It is vain, therefore, to prophesy what the real meaning will be simply by staring at the verbal form. Moreover, Formal Logic is constrained by its chosen standpoint to confound together *verbal* and *real* ambiguity, and so it diverts attention from real and serious failures to convey meaning to mere diversities of usage which an intelligent mind has no difficulty in understanding. How this comes about will easily appear if we consider how these two sorts of ambiguity arise.

In a Formal sense the ambiguous use of words is inevitable and ineradicable. For we have far more experiences than words wherewith to label and describe them. The number of words in any language is limited, but the number of phenomena with which we have to deal seems infinite. There are, therefore, an infinite number and variety of meanings we may desire to express

and convey with limited resources of language. Clearly, therefore, every word will have to do duty in many contexts, and with shades of meaning which it takes from its contexts; it will have to be worked for all it is worth, and more. This is why every word is (or may be) actually used in a plurality of senses. But so long as it serves to convey the meaning actually intended, the more meanings it can convey, the greater its capacity, *the better it is as a word*, the more useful, efficient, and economical it grows. It is *verbally* ambiguous, but *not* really. If we look up a word in the dictionary and find that it rejoices in a multitude of meanings, the right reflection is not 'How terribly ambiguous!' but 'What a useful word it must be!' The word 'fly,' *e.g.*, is not really ambiguous because it can be used as a verb or a noun, for a vehicle as well as for an insect and a fishing device. All such ambiguities, which it would be better to call *plurality of senses*, are merely verbal; they exist only in the abstract meaning of the word, and not in the actual use.

Real ambiguity is a very different affair. It means that a form of words, *when actually used*, fails to convey the meaning intended, or conveys one meaning to one man and another to another, or is intended to convey several meanings to a choice between which the assertor will not commit himself.[1] It consequently leads to misunderstanding or failure to understand, and alters or destroys logical meaning. It is therefore something to be really feared, especially as it is common enough, though

[1] To this last case it would be well to appropriate exclusively the term '*equivocation*,' which is at present used as a synonym for 'ambiguity.' *Indefiniteness* and *Indeterminateness* of meaning should also be discriminated from ambiguity, though either may lead to ambiguity. A meaning is indefinite if it fails to take account of possible distinctions, indeterminate if it disregards them. All meanings are liable to develop indefiniteness under criticism, if further distinction is demanded of them, and all indefiniteness involves indetermination, because in fact it leaves alternatives open. But an indeterminate meaning may be perfectly definite, because the alternatives it leaves open may really be irrelevant for the purpose in hand. For example, to say that 'meaning is relative to purpose' leaves the purpose *indeterminate*; but it is not *indefinite*, and may be a pointed protest against logics which ignore relation to purpose. Again, if any one divides the denizens of the air only into 'insects' and 'birds,' he will have to call a bat a bird; yet, 'It's a bat and not a bird!' will be an effective rebuke to such indefiniteness, whether or not we know the specific name of the bat we are indeterminately judging about.

infinitely rarer and more dangerous, because less noticed, than mere plurality of senses.

If, then, we lay it down that there is no effective ambiguity except where there is misunderstanding, it is clear that Formal Logic has no right ever to call a term 'ambiguous.' For as it has abstracted from its actual use and confined itself to the dictionary-sense of the word, it can never say whether the term *will be* wrongly understood on any actual occasion. It can only record that it *has been* misunderstood. But on this score *all* terms would be ambiguous; for nothing can be expressed so simply and clearly that stupidity or malice cannot contrive to miss its meaning. Hence Formal Logic once more fails to establish its distinction.

§ 9. (vi) *Relative and Absolute Terms*

An object or quality considered in itself is said to yield an *absolute* term; if in relation to another, a *relative*, while the related terms are called *correlatives*.

This distinction plainly cannot possibly be made sharp. For nothing is ever really absolute in its existence; everything is always related in some way or other to other things. To consider it in itself, therefore, is possible only by an act of abstraction, and in actual thinking this implies both a relation to the other term of the judgment and to the context abstracted from. Conversely, as in every act of thinking *all* terms are always related to others, those called 'relative' must be distinguished by their capacity to enter into special sorts of relation. In point of fact the relations which give rise to 'relative' terms are those in common use, and so easily and habitually suggested. 'Parent' suggests 'child,' 'son' 'father,' 'half' 'double,' 'greater' 'less,' etc. But the whole basis of the distinction is psychological, and accordingly the '*correlatives*' of the same terms will be found to vary in different minds. It is therefore wise of Formal Logic not to enter into such questions as why the correlative of 'son' should not be 'mother,' of

'parent' 'grandparent,' of 'half' 'whole,' of 'double' 'quits,' of 'greater' 'equal,' etc.

§ 10. (vii) *Positive, Negative, and Privative*

A further division of Terms into *positive*, *negative*, and *privative* hardly seems to repay the trouble it has caused to Formal logicians themselves. A positive term is said to imply the presence, a negative the absence, of a quality (as 'equal' and 'unequal'), while the privative term is used to indicate the absence of a quality which the object might be expected to have. Thus when we encounter *dumb* dogs, *blind* guides, and *senseless* doctrines we should appreciate their 'privative' character.

Of these distinctions the third may be dismissed at once with the remarks that what qualities objects normally have is a matter of experience, that our normal expectations about them are a matter of psychology, and that neither the one nor the other is a concern of Formal Logic.

The distinction of positive and negative terms, on the other hand, is an unsuccessful attempt to anticipate in the doctrine of terms an important distinction which properly belongs to the doctrine of judgment. Affirmation and denial are distinct and antagonistic psychic attitudes, which have found distinctive expression in language. Hence the idea suggests itself to stereotype affirmations and denials in the words which they commonly employ. And language to some extent lends itself to this design, though it also puzzles Formal Logic with forms like 'atom' and 'individual,' which are no longer negative, and 'void' and 'Absolute,' which are hardly positive, and 'infinity,' 'evil,' and 'error' which are debatable. However, the objection soon occurs that the so-called negative term usually or always indicates more than the absence of a quality and implies the presence of an opposite quality. Formal Logic welcomes the suggestion and bids us distinguish further between negative terms which are *contraries*, merely opposed

within the same general subject, like 'black' and 'white,' 'equal' and 'unequal,' and such as are true *contradictories*, like 'equal' and 'not-equal,' 'white' and 'not-white.' It assures us that the latter must divide the universe between them, because not-white includes all the things, like virtues, fallacies, and stories, to which the notion of colour is (strictly) inapplicable.[1]

The slightest reference to actual thinking, however, shows that this doctrine carries the use of logical figments beyond the limits of the tolerable. We never actually use such 'contradictories.'[2] It is not profitable to talk about the universe at large and to contrast a single aspect of it with all that remains. We always know enough about anything we are discussing not to leave its position as vague as that, and hence language does not form pairs of words in the form 'A' and 'not-A.' In actual thinking we are always interested in quite a limited sphere of references within which all our assertions and denials are understood to fall. If I deny that a thing is white, I am supposed to imply that it is some other colour. It may, of course, happen that the alternatives are limited to two, as that a man is either 'awake' or 'asleep,' 'alive' or 'dead,' and that the qualities in question are really *exclusive*. But Logic will have to regard this as a fact about the subject-matter, and not as anything to be extracted from the form of terms.

Nevertheless, a useful caution may be derived from this Formal doctrine. In actual thinking it is most important that there should be no mistake about the sphere to which our thought refers, technically called the *universe of diction* or *suppositio*. For if there is dispute or obscurity as to this, meaning cannot be conveyed, and disputants will either be arguing at cross purposes or about nothing at all. The very absurdity, therefore, of

[1] In practice it is, of course, impossible to guard against the play of metaphor, and so virtues may be 'lily-white,' fallacies 'glaring,' and stories 'black' or even 'lurid.'

[2] The philosophic disputations about Being and Not-Being, as in Plato's *Sophist*, are only apparent exceptions. For it turns out both that Not-Being is not a mere negation and that it is a sort of Being.

questions which transgress the *suppositio* may often be useful, by forcing us to realize what answers can really be relevant to our question, especially if they only just transgress it. The question 'Are virtues green or not-green?' will hardly aid ethical discussion, but 'Is a circle visible or not-visible?' may force us to realize the ideal nature of geometry.

§ 11. *The Relativity of Formal Classifications*

Lastly, it may be noted that all the Formal classifications of Terms are involved in a certain indistinctness and arbitrariness owing to the fact that not only may the meaning of a word be found habitually to reside on the border-line between the Formal classes, but that it may carry a multitude of associations on the basis of which it can be classified, and that we have to choose between a number of classifications, and may choose variously. It is the logician, therefore, who has to decide whether a term like 'empty' or 'injustice' is to be called relative, negative, or privative, and whichever way he decides, his choice seems to exclude some part of the full meaning. Formal Logic, therefore, does not fully exploit even the knowledge which is stored up in the dictionary.

Our examination of the Formal distinctions of terms has everywhere led to the same conclusion. They are not distinctions in thought, but in words, and at best refer to their average meaning and probable use. No appeal to them from the actual meaning of terms in use can therefore be allowed; the question of what in fact an assertion meant can never be omitted; to hope to dispense with it by an appeal to formal cut-and-dried distinctions is merely to cut off Logic from all contact with real thinking.

CHAPTER III

THE EXTENSION AND INTENSION OF TERMS

§ 1. *The Fourfold Analysis of Propositions*

FORMAL Logic has chosen to treat as an ambiguity in Terms what is really an existence of alternatives in the meanings which any form of words may be used to convey. It is therefore important to realize at the outset (1) that this 'ambiguity' can only occur in propositions (judgments), and (2) that it is not properly a real ambiguity at all, but, normally at least, a case of *plurality of senses* (cf. Chap. II, § 8).

In framing judgments about the objects of our thought there are four varieties of meaning which can be formally distinguished. We may intend to assert (1) about the relations of concrete things to each other, (2) about the relating of a quality or 'attribute' to a thing, (3) about the interrelation of qualities, or (4) about a quality in relation to a thing. As examples of phrases which would most commonly be meant and understood in each of these ways we may give as a case of the first, 'some philosophers are Christians,' of the second, 'the house is big,' of the third, 'Virtue is Knowledge,' of the fourth, 'all that glitters is not gold' (='lustrous qualities do not imply the presence of a gold object').[1]

Now it is evident that the second and fourth of these interpretations differ only in the matter of emphasis. In the second the object about which we are thinking figures

[1] Of course these phrases are not really judgments unless they are *used*, *i.e.* applied, in a suitable context, to a concrete situation.

as the Subject of the sentence, and the quality we are attaching to it or detecting in it stands as the predicate. In the fourth this quality is so prominent in thought that it is made the (verbal) Subject and trails the object, to which really it belongs, after it as the predicate. Now this is unusual, because, as we saw (Chap. II, § 5), the reason why we analyse what is before the mind into things and their qualities is precisely that ordinarily the things arrest our attention before their qualities are noticed. Hence judgments which suggest this interpretation are necessarily rare, and their real meaning can easily be expressed in the second form. On the other hand, the other three interpretations indicate permanent topics of scientific interest. We are interested in the relations of things to each other, and to their qualities, and in the interrelations of their qualities.

Which of these interests a judgment in any given case expresses is of course a matter of fact, granting that its assertor is clear as to what he means. It is likewise a matter of psychic fact that its author may *not* be clear as to which or how many of these interpretations he means, and that his assertion may be interpreted otherwise than he intended. Only in such cases will there be real ambiguity; in the others the meaning intended may be perfectly clear to every one, even though no one can say what the form of a judgment means as such, and whether *e.g.* 'all men are mortal' is in the abstract intended to be of type 1 or type 2.

§ 2. *The Inverse Variation of Extension and Intension*

Such in brief is the situation out of which Formal Logic has evolved its terribly involved discussions as to the meaning of terms in Extension and Intension. It begins by taking the matter out of its connexion with the actual judgment of the living thinker. It then translates the facts into a technical, but ambiguous and highly confusing, terminology. When the terms refer to the 'concrete' objects themselves, they are said to be taken in

extension or denotation; when to the qualities of objects, in intension or connotation. Words 'denote' things and 'connote' qualities. It then tries to determine what terms 'have' extension and intension, and what are lacking in either, and why; how extension is related to intension *per se*, and what a 'connotative' term is to mean.

It contemplates a number of common terms arranged in a serial classification, say 'ship,' 'steamship,' 'steel steamship,' 'battleship,' 'Dreadnought,' and decides that in such a series the intension grows greater as the extension progressively diminishes. There are fewer 'steamships' than 'ships,' fewer 'battleships' than 'steamships,' etc. And yet the qualities intended seem to increase. A 'steamship' means a ship propelled by steam, 'steel steamship' specifies an additional quality, a 'battleship' is a steel steamship with heavy armour, while a 'Dreadnought' is an 'all-big-gun battleship.' Thus each higher but less extensive class seems to carry all the meaning of the lower, and to add something of its own. On this observation is based a 'law' that extension and intension *vary inversely*, and that as the extension diminishes the intension increases, while as the extension increases the intension diminishes.

It should follow from this 'law' that when a class becomes so very select as to have only one member, its intension, *i.e.* the qualifications of which it implies the possession, should become infinite; while when it extends itself so as to become all-embracing, its intension should become *nil*. Thus a term like 'being' or 'universe,' just because applicable to all things, should mean nothing, while conversely every Proper Name should be fraught with infinite significance.

Such, however, is not the doctrine of Formal Logic, although, curiously enough, both these contentions might well be upheld on its principles.

(1) Since the number of qualities or attributes implied in the definition of a common term grows larger as the class is more specialized, an adequate definition of each successive class would grow longer and longer after the

pattern of *The House that Jack built.* When, therefore, the individual thing is reached, it is to be expected that an infinite list of qualities would be needed to define it. If, moreover, this inference were logically drawn, Logic would opportunely warn Metaphysics to respect the dignity of the individual real, which presents an inexhaustible subject of study. Instead of this, Logic sacrifices consistency and rigour of thought to the practical convenience of an artificial simplification. An infinitely-extended definition is evidently not practicable. Whatever, therefore, demands such a definition is practically indefinable: a definition to be useful must be handy and compendious. So Formal Logic allows definitions to rest on a *selection* of a thing's qualities and to disclaim exhaustiveness. This is why it prefers to teach that individuals are indefinable, and that Proper Names have no intension (cf. Chap. VI, § 2).

(2) As we advance to more and more inclusive classes in our series of terms, we progressively eliminate the specific differences which defined the lower class, and with the removal of each specific quality the meaning seems to grow more indeterminate. When, therefore, the all-embracing class is finally reached, it seems to mean everything in general and nothing in particular. This reasoning again the traditional doctrine recognizes when it declares that the *Summum Genus*, the highest and most extensive class of all, is as indefinable as the Proper Name. But it was a just criticism of such a procedure to declare that it left nothing in the notion of 'being' to distinguish it from nothing, and that if so empty an abstraction formed the culmination of thought, it could be only by a radical revulsion which returned to the concrete that thought could retain any meaning.[1]

[1] This obvious difficulty in Formal Logic is apparently what underlies the Hegelian 'Logic.' Hegel started his 'Dialectic' from the paradox that *Being and Nothing are the same*, and tried to show that thought could not purge itself from 'contradiction' until it had returned thence to the concrete, *i.e.* to the category of 'Spirit.' But he did not see that so long as *any* 'category' is *unapplied* it remains abstract, and that when applied, not only 'spirit' but also 'being' become concrete and significant. So he followed the Formal Logic whose adequacy he was questioning into its abstraction from actual thinking, and thereby rendered futile his enormous labour. The real solution of the puzzle is much simpler.

But there is a much simpler objection to the traditional logic which cuts much deeper. It often occurs spontaneously to the common-sense of beginners, and is really sound, though teachers of Formal Logic have to disallow it. It is true that though the qualities *stated* in the definition of a more extensive class or genus are fewer and less determinate than those stated in the definition of its species, yet the qualities *possessed* are more. For a genus must have the qualities of *all* its species. After all, the qualities of 'battleships' are among the qualities of 'ships.' Hence it is plainly false that the qualities implied diminish as the classes grow more extensive. 'Being' in the end means everything, and not nothing. It is true that nothing is left outside it, by contrast with which it may be defined; but this does not prevent us from thinking of the qualities it has, *when we really think about it.* For each and all of them will serve to distinguish it from Nothing. When, therefore, it figures in actual thought 'Being' means the whole wealth of beings; what has turned out to be logically meaningless is only the dictionary-meaning of the word.

§ 3. *Comprehension, Subjective Intension, and Connotation*

The painful truth is that the doctrine of Extension and Intension can never be cleared of perplexities until logicians make up their minds to *which of three* sets of qualities they want it to refer, and devise distinct names for each.

The qualities intended may be:—

(1) The sum total of qualities possessed by all the objects to which the term may be applied, whether these qualities are known to us or not.

(2) The qualities which the term suggests to our minds. These are never the whole, but always more than

(3) the qualities necessarily implied in any application of the term, the minimum of meaning that serves to distinguish the term from all others and is embodied in the dictionary definition of the word.

Now the traditional doctrine will hold only of the third. If applied to the first sense, it is flagrantly untrue; if to the second, it may be falsified by the accident that a term of wider extension, say 'whale,' may be more familiar to us than one more specific, say *Balaena mysticetus*, so that it means more to us. But this is plainly a psychological fact and so excluded from logic as defined.

It is only, therefore, to cases where the third set of qualities may be distinguished that the Formal doctrine applies, and with it the limitation of the possibilities of definition. Incidentally this illustrates the verbal origin of the traditional Logic. For if a dictionary is searched the verbal definitions of *summa genera* will be found to be very defective, while definitions of Proper Names will not be found at all.

If, however, we follow Dr. J. N. Keynes[1] in distinguishing these three sets of qualities, as (1) the *Comprehension*, (2) the *Subjective Intension*, and (3) the *Connotation* of the term, these anomalies will be found to disappear. All terms have Comprehension, because all can be used to mean any or all of the qualities of the things they apply to. All terms that are *understood* to have meaning (*i.e.* actually function as vehicles of meaning) have also Subjective Intension. But neither *summa genera* nor Proper Names have Connotation in the restricted sense, nor can they be formally defined.

§ 4. *The Meaning of Proper Names*

It is possible, therefore, to dismiss the protracted dispute as to the meaning of Proper Names very shortly. J. S. Mill, after defining as 'connotative' terms that both denoted objects and implied qualities, and as 'non-connotative' those that failed either to denote objects or to imply attributes, found that he had lumped together terms so unlike in function as abstractions and Proper Names. For what could an abstraction be said to denote,[2]

[1] *Formal Logic.*

[2] The difficulty arises solely from the abstractness of the Formal standpoint. For as we saw (Chap. II, § 6) abstract terms in actual use always have a concrete application, and can thus be said to denote whatever subject is under discussion.

and a Proper Name to imply? Nor, again, could it be said that a Proper Name of itself meant any quality more than any other.

His critics thereupon proceeded to identify lack of Connotation with lack of meaning, and to denounce Mill. Now Proper Names are certainly not meaningless. A name like Publius Cornelius Scipio Africanus Aemilianus means a whole chapter of Roman History. Does not a Proper Name, therefore, mean the person to whom it applies with all his qualities? (*Comprehension*). Does it not suggest his qualities to those who know him? (*Subjective Intension*).

The disputants clearly were at cross-purposes. Mill's doctrine was right enough as regards the restricted sense of Connotation, though he did not distinguish it from the *Subjective Intension* and *Comprehension*, which Proper Names of course possess. We cannot make a compendious selection of an individual's qualities, regard it as the core of his being, and call it his essence. And even if we could, this 'meaning' would not get attached to the name itself. For the name is detachable, and can be transferred to any number of other individuals.

Now it is a peculiarity of Proper Names that when they are thus transferred from one individual to another their meaning changes *totally*. A similar transfer of a common term hardly seems to affect its meaning at all. When 'man' is transferred from Tom to Dick, a solid nucleus of common 'humanity' in both seems to survive the change.[1]

[1] On this objective fact fantastic doctrines of 'universals,' of abstract qualities mystically 'common' to all the individuals of a kind [cf. Chaps. VII, § 2, § 9, VIII, § 5], have always been based by philosophers. But the facts of predication form a very slender basis for such metaphysics. When we called Tom and Dick both 'men,' we hardly meant to represent them as participating in the identity of a 'universal' that somehow pervaded all the 'cases' of its 'kind.' We merely meant that, for some passing purpose, it was convenient to ignore the differences between them and to call attention to the general likeness in their appearance and behaviour. The intrusion of metaphysics into the simple practice of predication, moreover, begins to look less edifying when we reflect that we might have called them 'rascals' or 'ruffians,' and so have foisted upon the universe an eternal universal of 'rascality' or 'ruffianism.'

CHAPTER IV

THE CATEGORIES

§ 1. *Aristotle's List*

THE Categories represent another ancient, famous, and futile attempt to prescribe Formal laws to the activity of thinking and to confine its operation within the pigeon-holes of a rigid classification. They were put into Logic by Aristotle, and have remained in because no one has ventured to remove them.

The line of thought which leads to their recognition proceeds as follows.

Since judgments can (if we ignore tenses [1]) be thrown into the form, a *subject* is a *predicate* ('S is P'), the attempt might be made to classify all the predicates that the *copula* 'is' attaches to the subject. And since the copula always seems to predicate 'being,' we can ask, What are the sorts of Being we can predicate? Hence the Categories were described by Aristotle as *γένη τῶν ὄντων*, kinds of ways of saying 'is.' Unhappily the phrase proved ambiguous. A classification of predicates seems, *prima facie* at least, a possible enterprise for logic. But if 'being' is taken ontologically as meaning real existence, and the Categories are allowed to become 'kinds of existence,' there is initiated a profound and

[1] This abstraction from distinctions of time, which renders thought logically timeless or 'eternal,' is one of the most questionable of logical devices, and the source of endless confusion and sophistry. For our actual thoughts not only occur at definite points in the time-series, but usually are meant to refer to such, and so the abstraction from time is made an excuse for abstracting from the actual meaning. But the subject is too complicated to be discussed as yet.

ineradicable confusion between logic and metaphysics, and logic is forced into the false position of having to dogmatize *a priori* about the possibilities of real existence.

The attempt, therefore, to ascribe metaphysical value to the Categories, to identify the 'is' of predication with that of real existence, which will meet us again in discussing the question of the existential value of the Copula (Chap. IX, § 4), suffices to vitiate the traditional doctrine.

The situation, however, is really worse. For Aristotle, in compiling the actual list of his Categories, seems to have been guided neither by logical nor by metaphysical considerations. His Categories embody rather the results of reflection on the forms of the Greek language, and are among the best illustrations of the Formal logician's common assumption that the nature of thought is faithfully mirrored by its expression in language, and that, therefore, a study of words may conveniently take the place of that of living thought. Now in general this assumption is (roughly) true; the forms of language are expressive of the nature of thought because they have been moulded by it. A *comparative* study of linguistic forms, therefore, would possibly yield a fairly complete list of the needs of expression which had become common enough to have received such embodiment. But the belief that a single language, with all its defects and idiosyncrasies, could provide a fixed and infallible guide to the ultimate nature of thinking and being, is only surpassed in *naïveté* by the tacit assumption of every metaphysician that *his* system expresses the absolute, universal, and final truth about the universe.

In justice to Aristotle's doctrine of the Categories, however, it should be admitted that the assumption of finality is here less obtrusive than elsewhere in his logical system. He never seems to claim exhaustiveness for his list of Categories, and rarely troubles to enumerate them to the maximum number of ten. Moreover, he consents himself to recognize differences in their value and importance. The first, *Substance* (*οὐσία*), overshadows the rest.

Its genesis is to be sought in the noun substantive. The next three, *Quantity* (ποσόν), *Quality* (ποιόν), and *Relation* (πρὸς τί), are clearly expressive of adjectives. The fifth and sixth represent adverbs of *Place* (ποῦ) and *Time* (ποτέ). The last four are attempts to formulate the logical functions of the verb, which are suggested by the general distinction of the active and passive voice, viz. *Activity* (ποιεῖν) and *Passivity* (πάσχειν), and by peculiarities of Greek usage, viz. *Situation* (κεῖσθαι) and *State* (ἔχειν).

§ 2. *A general Objection to the Notion of Categories*

The logical value of this classification is open to much dispute.

(1) First of all, and as a matter of principle, it must be denied that the problem of the Categories, as conceived by Formal Logic, is scientifically soluble at all. For on reflection it must occur to us that there must be as many ways of predicating, of attaching a predicate to a subject, as there are distinct problems in the sciences. For though the sciences (more or less) use the common forms of speech, because they have to, yet they always *mean* them in the senses appropriate to their own subject-matter. For example, a geometer may say, 'These lines are parallel,' and a psychologist or teacher of perspective may reply, 'No, they are convergent'; an artist, 'Yonder mountain is blue,' and a geologist, 'No, it is basalt';[1] 'a theologian, 'The law of life is self-sacrifice,' and an economist, 'No, it is the production of wealth'; a chemist, 'Man is mostly water'; a moralist, 'No, he is mostly wicked.' But these contradictions are only apparent, because each of these experts is speaking from his own point of view, and they are not using the word 'is' in the same sense. When we understand the

[1] If an actual example is preferred, we may take one from the opening of W. S. Symonds' *Old Stones*. "'What may these hills be, sir?' said a gentleman one day as the train was running rapidly along between Worcester and Cheltenham. I replied, 'Oh, they are Plutonic rocks,'" to the dismay of the questioner, who wanted the answer 'the Malvern Hills'!

meaning in its proper context and with reference to its peculiar subject-matter, the assertions become compatible. Unless, therefore, the logician can claim to understand all the scientific problems there are or have been or ever will be, he cannot compile an exhaustive list of the categories which predicate 'being' of a subject. But from claiming such omniscience he is debarred, not only by its absurdity, but also by his own initial disclaimer of 'material' knowledge. And even if neither candour nor consistency availed to check him, his ambition would be baffled by the facts that new problems, needing new 'categories,' may arise or be devised, and that certain problems are classifiable at will in various categories. For example, the nature of life may be treated physically, biologically, psychologically, ethically, metaphysically, poetically, according as we please. Hence no table of Categories could possibly do more than provide a rough guide to the probable meaning of any predication.

§ 3. *Special Objections to Aristotle's List*

(2) Many difficulties of detail arise in connexion with Aristotle's list of Categories.

(*a*) The first of these concerns the position of *Substance*. Is the (logical) subject to be included in the list of Categories? Clearly it ought *not* to be; for it is that which the predication is about. If, therefore, the list is taken logically as a classification of predicates, the subject is not a *Substance*. But if the Categories are 'kinds of being' (in the metaphysical sense of *γένη τῶν ὄντων*), the subjects of our predicates cannot be excluded from the list of *existences*. Indeed they generally are substances *par excellence*, the ultimate realities we are trying to know.

So into the list they have gone, producing the distinction between *first* and *second* 'substances' (*πρῶται* and *δεύτεραι οὐσίαι*), *i.e.* concrete things and their attributes. It was the more necessary to include them, because the *word* which marks the subject of one predication so often and so easily becomes the predicate in the next, and so

upsets the belief in any ultimate difference of logical nature between subject and predicate.[1] Nevertheless Aristotle held that 'first substances,' *i.e.* concrete things, were not properly to be used as predicates, and later philosophers have found more convincing examples of subjects which could never be predicates than any he adduced. Aristotle, for example, had not yet discovered the strange case of the Self or 'I' which appears to be a subject *ex officio*. In general his doctrine is near enough to linguistic usage, though the existence of phrases like 'It is I' forces the logician to explain that here the 'I' is not *in thought* the true predicate. But even in thought it is not clear that the Self cannot be conceived as a predicate, unless all monistic philosophies are inconceivable; for they always seem to think of all selves as predicates of the One. Similarly in materialisms they are all thought of as a function of matter. What is clear, however, is that the category of Substance easily gets involved in very abstruse questions of metaphysics.

(*b*) The rest of the list exhibits defects both of redundance and of omission. It is redundant, because it is perfectly feasible to regard all the other categories as forms of *Relation*: it is defective, because the enumeration of relations is very incomplete and the mention of those selected seems arbitrary. It is true, indeed, that theoretically the number of relations is infinite, seeing that the nature of a relation varies with the peculiarity of its terms (cf. § 2). But even if we confine ourselves to a practically convenient amount of distinction, why should many obvious distinctions which are in common use obtain no place in the list? There is no apparent reason on Formal principles why, *e.g.*, the Category of *Quality* should not have been subdivided into the various qualities of sensa-

[1] Of course in any actual predication the 'second substance' must be *either* subject or predicate, and cannot be *both*. It is only when the actual use is abstracted from that its logical position becomes ambiguous. But, as usual, we are then no longer dealing with actual meanings, but only with verbal symbols for them. When a question is raised whether *Pithecanthropus erectus* was a man, 'man' is a predicate in a definite scientific context; when the question is whether man is mortal it is as definitely a subject in another sort of scientific context: but the identity of these two uses is only verbal.

tion, colour, sound, etc., or why no categories should be provided for the conceptions of *values* and *ends*, or for the distinction of *persons* and *things*. Lastly it should be observed that the categories of *Activity* and *Passivity* embody a scientific blunder. It is true that this distinction demands recognition on the plane of ordinary life and speech. It is real for immediate experience, because to do a thing and to have it done to one feel different. But physics has long taught us that neither activity nor passivity exist by themselves, and that all the apparent cases of either really contain both, and result from an *interaction*. Hence a category of Interaction (or 'Reciprocity') should either have been added to the list or substituted for 'Activity' and 'Passivity.'[1]

[1] The twelve Categories of Kant are logically superior to Aristotle's in the important respect that they are less clogged with metaphysics and refer more definitely to the logical process of knowing. But they are open to similar objections. Schopenhauer rightly said of them that they could all be reduced to Substance and Causality; and even then it should be noted that substance is not knowable without causality. Moreover, the very fact which makes Kant proudest of his list, viz. the systematic deduction of the Categories from the forms of Judgment, really suffices to ensure their condemnation by a critic of Formal Logic. They can no more touch real truth than it.

CHAPTER V

THE PREDICABLES

§ 1. *Their Meaning*

THE 'Five Words' in the list entitled the Predicables contain distinctions of terms which the student of Formal Logic often finds it hard to differentiate from those of the Categories. It would appear, however, that the problem of which the Predicables are given as the solution is that of classifying predicates, not as they are in themselves 'out of syntax' or as 'kinds of being,' but as they are in the judgment—or rather in the form thereof. They should therefore be less abstract than the Categories and nearer the actual judgment. But in practice they have been so adapted and sacrificed to the needs of a particular theory of Definition and, prospectively, of Proof, that the subject has become one of the most intricate chapters in the whole of Formal Logic. Moreover, it has been complicated by the fact that whereas the theory of the Predicables originally rested on and led up to a peculiar theory of knowing which has been radically impugned, and (in the writer's opinion) definitively refuted, by the procedure of modern science, the growing perception of this fact has never been allowed to lead to a radical reform of the Predicables.

§ 2. *Their Metaphysical Basis*

The theory of knowledge assumed in the original account of the Predicables by Aristotle may be briefly

stated as follows. (1) Scientific knowledge, in the strict sense of the term, is not about individuals, but about kinds.[1] (2) Kinds are not *Concepts*, not mere devices of human thinking, but *Universals*, real entities eternally fixed in the order of nature. (3) Man already knows (by intuition, 'reminiscence,' and, perhaps, experience) what these kinds are, and has laid down his knowledge in language, which therefore may safely be appealed to for the decision of questions about the definition and nature of things. (4) Science therefore may start from the name of such a kind, technically called a *Species*, and interrogate language about it.

§ 3. *The Five Questions about a 'Kind'*

Five questions may be asked about it. (*a*) First of all, What is it? What is its *Essence*, that which it most truly *is*, that which makes it what it is? The answer is given in the *Definition* of the kind, which is (or should be) a statement of its Essence.[2] (*b*) How is it related to other such kinds in the fixed order of nature? And, particularly, to the kind immediately above it, the proximate *Genus* which includes it? (*c*) How is it distinguished from the other kinds in the genus? Technically, what is its *Specific Difference*? (*d*) What are the permanent qualities which are characteristic of and peculiar to it, and essential to its remaining what it is? These will constitute its *Properties* and will be deducible from its Definition, as *e.g.* the Properties of geometrical figures are from Euclid's definitions. Thus to have three angles equal is a Property of equilateral triangles, without being part of its Definition. (*e*) Lastly, kinds exhibit qualities or modes of behaviour which seem unconnected with their Essence, and the reason for these we do not fully understand. But our

[1] This assumption stands out much more clearly in Plato than in Aristotle, in whom there seems to be a discrepancy between logical and metaphysical theory. His logical position seems to involve the above assumption, but he nevertheless holds that individuals are metaphysically real and therefore the ultimate subjects of predication. Cf. his distinction of πρῶται and δεύτεραι οὐσίαι (Chap. IV, § 3).

[2] For this see Chap. VI.

classification provides for them the rubric of *Accident*. Whatever cannot be *demonstrated* by being deduced from the Essence is therefore an Accident. But true science scorns accidents. They vary too much, they come and go, and things may have them or not as may chance; they are therefore '*contingent*' and science aims at the *necessary*. Things may do without them without losing caste and ceasing to be themselves, whereas to lose its Essence would be a thing's annihilation.

So every object of thought seems to be satisfactorily provided for. Whatever is predicated of a *Species* must be either its *Definition*, *Genus*, *Difference*, or one of its *Properties* or *Accidents*. Theoretically its place in the universe is fixed, and it is knowable throughout, even though the rubric of Accident looks remarkably like a residuum or rubbish-heap, suggestive of the well-known item 'sundries' in making up accounts. It is a simple corollary from this classification that the right Definition of a Species is by stating its Genus and its Difference, and an obvious observation that the whole doctrine (which in its essentials goes back to Plato) is based on reflection on the nature of the mathematical sciences as they then appeared to the philosophic eye.

§ 4. *The Difficulty about the Individual*

The whole doctrine of the Predicables is constructed to deal with kinds, which alone were predicable and knowable in Plato's philosophy, from which his great pupil Aristotle could never quite emancipate himself. But after all, on the common-sense level of life at least, there are other things in the world. There are individuals, and for dealing logically with these the Predicables provided no apparatus. They were a despicable horde of pariahs seething lawlessly beyond the limits of the scheme. Those limits were clearly marked. The applicability of the Predicables extended from the *Summum Genus* above, the highest all-inclusive class which could no longer be defined *per genus et differentiam*,

because there was no higher class of which it could form a species, to the *Infima Species*, the lowest class which could be subdivided only into individuals. And good reasons were given for drawing this line also. For the nature of the individual cannot be *defined*. The individual has, as such, no Essence. All his qualities and behaviours seem equally necessary to his being, and no essential extract can be made. His uniqueness is inexhaustible and the list of his qualities endless. Hence the distinction between Property and Accident becomes unmeaning. Nor, again, can the differences between one individual and another of the same kind be stated in a neat and handy formula; they are infinite, and so there is no Difference. Science, therefore, stops short of the individual. It must assume either that he is as such unknowable, or that for scientific purposes the individuals of a Species may be taken as equivalent. To extend the Predicables to him is, therefore, wrong in principle.

§ 5. *The Difficulties about Accident*

Nevertheless this extension was attempted, at least as early as the third century A.D. (by Porphyry), and that not only for practical reasons. It looks like a gap in logical doctrine, if it has nothing to say as to how to predicate about individuals; and after all Predicables are undoubtedly asserted of individuals.

Now if the Predicables are extended to individuals, there is no reason why their species should not be predicable of them. An *infima species* like, *e.g.*, 'man' therefore ceases to be the subject of predication and becomes predicable of individual men. *Species* therefore becomes a Predicable, while *Definition*, being already adequately represented in the list by *Genus* and *Difference*, which together constitute it, can be relegated to a separate chapter.

On the other hand, a distinction can be made among the individual's qualities which is analogous to that between Properties and Accidents in the case of Species.

For though they are logically all alike Accidents, yet there are some qualities of an individual which he cannot alter, *e.g.* his race or the colour of his eyes. These then are *Inseparable Accidents*, as contrasted with *Separable Accidents*, like the state of his temper, or the fact that he is wearing a particular suit of clothes. The lines, however, both between Separable Accidents and Inseparable, and between the latter and Properties, become hard to draw. The Inseparable Accident is supposed to differ from the Property in that it could be conceived to be otherwise without destroying the identity of the subject. But is this really so? An Englishman may speculate as to whether he would have burnt his mother at his father's funeral if he had been born a Hindu, but there would hardly be enough identity between his two lives to give meaning to the question. The Inseparable Accident tends to take the position of a Property, of which the connexion with the Definition has not yet been made out, but is still a scientific hope. Again, even the Separable Accidents seem to be expressions of more permanent habits. A man's taste in clothes is what ultimately determines what he wears at any time, and his general temper decides whether any particular incident pleases or annoys him.

Lastly, it is clear that a consistent determinist ought to have difficulty in accepting all these distinctions. He cannot believe that any event could be otherwise than it is, and must disbelieve in the reality of the 'contingent.' Whatever happens must be the necessary consequence of its antecedents. Hence *nothing* can be Accident, and if he knew enough everything could be deduced. His only resource, therefore, is to render the distinction of Property and Accident subjective, and to reduce it to a defect in our knowledge. But if all Accidents are really Properties, not only is the integrity of the five Predicables impaired, but the whole doctrine splits up into two, and the objective or metaphysical view, which denies the distinction, grows incompatible with the logical view, which retains it as merely subjective. This conflict is

further exacerbated by the fact that it does not merely arise for the metaphysical determinist. For indeterminists also would agree that, as a matter of working assumption, all science assumes that events are determined,[1] and hence the denial of accident and contingency becomes a postulate of scientific logic.

§ 6. *The Meaninglessness of the Inapplicable*

It would seem, then, that the doctrine of the Predicables goes all to pieces if it is applied to individuals. But can it preserve itself by disclaiming such application? This raises the question whether the first assumption of its underlying theory of knowledge is true in point of fact. Is the individual a scientifically negligible factor in the universe?

The belief that this is so is one of the oldest and most obstinate of philosophic prejudices, and it is exceedingly difficult to get philosophers to see that it is not borne out by the practice of the sciences. Yet, in point of fact, the 'laws,' 'kinds,' and 'universals' are always intended to be *used*, *i.e.* to be applied to the facts, and if they fail persistently to function so, they have to be superseded by others. For the truth is that they are the means by which we forecast, with ever-growing precision, the unique course of events, adjust our actions to it, and are enabled to control it. What science demands, therefore, is power over the particular case, and what its recognition of inexhaustible individuality means is that no limits can be assumed to the growth of this power, or set to its own progress.

To realize that there can be no sense in calling true a law that is inapplicable to the individual case, we have merely to suppose a discrepancy between fact and theory, to imagine on the one hand a perfectly coherent and symmetrical system of laws, and on the other a world to which that system was wholly irrelevant, in which things systematically happened otherwise than calculated.

[1] Cf. *Studies in Humanism*, chap. xviii, § 4.

Surely no sane man would call such 'science' true? He might call it the Code of Fairyland, and admire its beauty and formal perfection, but he would have to devise another system for the mundane purpose of guiding his expectations. And it would be to this latter that he would reserve the title of 'true.'

Unfortunately the abstraction of its standpoint conceals from Formal Logic the failure of its doctrine. Its habit of abstracting from actual meaning frequently beguiles it into abstracting from meaning altogether, and then supposing that it has reached the standpoint of the 'ideal.' It has never grasped the fact that the meaning of a doctrine depends on its application, and that if, to evade objections, it is so interpreted as to become inapplicable, it simply becomes unmeaning. For it then escapes the only test by which its truth could be discriminated from its falsity, and its real validity established. A science which was *only* about kinds which were never exemplified by facts would be empty—a mere vagary of the imagination. It would float in the ether of fancy and never touch solid earth. If, therefore, the only way of making the doctrine of Predicables consistent is to disclaim application to the particular case, it is disclaiming not only all usefulness but also all real meaning.

Thus the principles which are really at stake in the apparently technical dispute whether the theory of Predicables extends to individuals, are whether Logic is bound to provide a theory which is applicable to the facts of scientific procedure, and whether a doctrine can intelligibly be called true when every test of its truth or falsity is ruled out of order. Those who think it can may defend themselves by the contention that to claim truth is enough, and that this formal claim is all Logic is concerned with. But such at any rate was not the original claim of the Predicables. They laid claim to real validity and an important application to the knowledge of reality. Indeed it is upon this claim that a further serious objection to the doctrine must be based.

§ 7. *The Logical and Metaphysical Aspects of the Theory of Predicables*

Just as the traditional doctrine of the Categories was found to involve a confusion between the logical problem of classifying the various senses of '*is*' used in scientific inquiries, and the ontological problem of classifying the various relations of qualities to the substance which possesses them, a confusion typically expressed in the term 'attribute,' so the theory of the Predicables fuses together two questions which can only be profitably discussed apart. The question of the logical nature of our procedure in predicating should be kept distinct from the ontological problem of why our predications work. For though there is, of course, a connexion between them, and a complete theory of knowledge would seek to answer both, no clear understanding of either problem can be reached if they are confused together.

The theory of Predicables is initially concerned with a logical problem. It is a fact that we do in practice handle the objects we think about by classifying them in systems of genera and species, by defining them, by analysing their behaviour, and by marking the relative importances of the different modes of their behaviour. It is true also that we may be said to effect these operations by the instruments of thought called 'concepts.' And it is an obvious condition of our persistence in this practice that (on the whole and on the average) our procedure should be successful. Our predications must work if they are to continue. They are, therefore, held to be true and applicable to reality.

But this does not pledge us to the belief either that all the manipulations to which we find it convenient to subject our concepts must have their counterpart in reality, or even that they should in any way aim at copying the inner structure of reality. We are free, then, to operate at will, to feign whatever we need, on condition that our results admit of successful application. We may begin with crude guesses and obvious fictions, and never to the

end achieve anything else than a *translation* of the ways of the world into an order of our thought which grows more and more adequate to our purposes. It is not necessary, therefore, that to every distinction of thought there must be assigned an objective validity.[1] The primary purpose of distinctions is to facilitate our thinking, and this may be the proper function of those also which are enshrined in the list of the Predicables.

The Predicables, then, may be taken in a purely logical sense, and without reference to their alleged ontological significance. If this is done, their artificial rigidity will disappear. We shall naturally assert the right of classifying variously for various purposes, and of recognizing such genera and species as our immediate purpose requires. We shall stop making species wherever we are not interested to distinguish further, without imagining that every inquirer will hereafter have to stop at just that point. Similarly we shall be able to define variously, and to recognize as a thing's Essence and relevant Difference, whatever happen to be its most important aspects. That we can predicate about individuals will be obvious; for that is what the whole logical apparatus is wanted for. Above all, we shall not need to regard species as more than convenient groupings of individuals, and can regard every individual as potentially a species. The distinction, moreover, between Property and Accident will become a relative one. A Property will mean a quality or mode of behaviour which is relevant to a scientific interest; an Accident, one that is judged to be unimportant, irrelevant, and therefore 'unessential. It will no longer seem a paradox that to a moralist the weight of the good man should be as accidental as it is essential to a transportation company. Thus this unstiffening of the doctrine, by relieving it of the claim to absoluteness, and rendering it relative to purpose throughout, will give it the flexibility which is needed for scientific purposes.

On the other hand, the metaphysical validity of our

[1] *I.e.* it all depends on the sense given to 'objective.' If it means '*copying* reality' the remark holds, though our distinctions must always be '*applicable to* reality.'

procedure will cease to seem a burning question. It will cease to seem an urgent intellectual need to decide whether 'Being' or 'Object of Thought' is *the* Summum Genus, whether Man or Englishman is *the* Infima Species. We shall puzzle no longer over the fact that *the* Definition of man as a rational animal accounts for so little of his conduct, and shall venture upon alternative definitions, even in mathematics. Doubts will assail even the doctrine of Essence. How, it will be asked, is any one to know what it is that makes a thing what it is? How know that there is such a thing at all? Is not all we know of a thing the way it behaves? Is its 'substance' more than the sum of its behaviours? Is not the notion of a 'substratum' which underlies them as bad a metaphor, and as impenetrable a mystery, as that of an essential core? Why, then, should we not content ourselves with *selecting* the most striking and important of its behaviours as the true essence, and recognize that it varies with the nature of our interest? To the theologian the essence of man is that he has a soul, to the doctor that he has a body, to the cook that he has a stomach, all of which are liable to get out of order. From different points of view it is equally essential to man's existence that he should make money, and that he should make love. But why obscure these facts by metaphysics? Lastly, inasmuch as Property follows from Essence, either demonstratively as consequence from ground, or in point of fact as effect from cause,[1] and as every actual behaviour may become significant and essential for some inquiry, it is clear that no metaphysical significance attaches to the distinction of Property and Accident.

We conclude, therefore, that the second presupposition of the Formal theory of Predicables (cf. § 2) is false. The Predicables are primarily logical, and kinds are Concepts which may or may not have (more or less) ontological validity, *i.e.* application. Logic need not decide this metaphysical question.

[1] This concession to actual scientific procedure has now crept into most statements of the doctrine of Predicables.

There remains, however, the question why our Concepts work. This fact has been considered very remarkable, and it is alleged that the only conceivable explanation of it is that in point of fact they are more than Concepts. They are 'Universals,' and Universals are not mere thoughts but things, real entities more real (though different in nature) than the objects of perception. Or else, it may be, things are thoughts, the products of some vaster mind confusedly apprehended by us. In either case our Concepts work, because they are identical in nature with the things they know.

This explanation evidently plunges very deep, like a harpooned whale, and cannot be pursued by us into the murky depths of metaphysics. Perhaps it might be brought back to the light of day by the reminder that *false* Concepts as well as true have to be accounted for as objectively existent universals, and that every error that has ever been asserted must thereby make good its claim to subsist eternally in the realm of ontological reality. But for our present purposes it will probably suffice to deny that no alternative explanation of the facts is feasible. There is in existence a solution of the mystery which is as simple and unromantic as that of the mystery George III could never fathom, viz. how the apple got inside the dumpling. Our Concepts work and are applicable to reality, because if they did not work we should not use Concepts, or at least should not use those we do. Besides, they never work so perfectly that science need despair of improving them. In practice it is continually improving them.

§ 8. *Darwin* v. *Formal Logic*

The practice of Science, therefore, conclusively refutes the metaphysical interpretation of the Predicables. It handles them with the utmost freedom, and will recognize no finality about them. The contrast between the original theory about the Predicables and their actual use is glaring.

But it is possible that logicians would never have

discovered it, if a crucial case had not arisen to emphasize the conflict. Biological science, in order to satisfy its need of arranging its subject-matter, had long divided living beings into species, genera, families, orders, etc. In general agreement with the established logic, it had regarded this ordering as objective and rigid. Then came Darwin and revolutionized biology by discrediting the belief in the fixity of species.

But Darwin was probably unaware that he was also initiating an even greater upheaval in logic. For Darwinism carries with it a denial of the ontological validity of the notion of species, and proves it to be only a subjective convenience—a convenience signally attested by the way in which biologists continue to distinguish species, although they can no longer think of them as each a fixed and eternal metaphysical entity pervading its individual members and unaffected by their fortunes. Darwin conclusively showed it to be conceivable that one species might develop into another by the accumulation of individual differences under natural selection. Thus a species is really nothing but a temporary grouping of individuals, all of whom are indefinitely variable and capable of developing in various directions. That they form a group at all (in so far as they do—for the distinctions between 'species,' 'sub-species,' 'variety' and 'race,' are fluid and arbitrary) is partly a matter of convenience, partly an accident. For we happen to snapshot them in that stage of their racial development at which they may conveniently be grouped together. But it is a mistake on this account to regard them as stereotyped. If the course of events could be reversed before our eyes, and all the past members of a species could be recalled to life, we should watch each species gradually fusing with its congeners, the genera coalescing with their families, individuals exhibiting the qualities of what have since become divergent kinds, and at last learn the lesson that all the various forms of life have had a common ancestry, and are never realized except in individuals.

Species, therefore, ceases to exist as an ontological reality. The individual alone is real. He alone bears the burden of the whole past, and contains the promise and potentialities of all future development. We conclude, therefore, that science cannot be indifferent to him, and that the doctrine of real kinds is metaphysically false.[1]

The proof of its falsity in strictness only holds, of course, in biology. But the evolutionary method has rapidly spread into all the sciences and everywhere altered the status of their classifications in a similar way. The astronomer now conceives the notion of an evolution of the different kinds of stars, the chemist of an evolution of the 'elements,' the physicist of an evolution of matter itself. The old theory of the Predicables thereupon at once ceases to be applicable in these sciences. Hence reluctant logicians have to admit that "the problem of distinguishing between Essence and Property in regard to organic kinds may be declared insoluble."[2] "The full nature of an organic species is so complex, and subject to so much variation in different individuals, that even if it could be comprised in a definition, the task of science would hardly consist in demonstrating its properties. To discover the properties of kinds belongs to the empirical, and not to the scientific, stage of botany or zoology."[3] The theory of the Predicables implies "a scheme of knowledge which cannot be realized upon all subjects."[4]

§ 9. *Is Mathematical Truth of a different nature?*

The knowledge, then, to which the theory of Predicables would apply becomes an ideal, but one which is still held to be approximately exemplified in mathematics.

[1] Physiological chemistry has already reached such a pitch of perfection as to detect by 'haemolytic' methods that "the red blood corpuscles of any individual are characterized by a definite individuality of their own, and can be distinguished from those of any other individual of the same species" (*Nature*, No. 2121, p. 512).

[2] Joseph, *Introduction to Logic*, p. 88.

[3] *Ibid.* p. 89.

[4] *Ibid.* p. 92.

Thus the theory's last appeal is to the science which suggested it. If its analysis is not true of mathematics it is not true at all, and its ideal of knowledge is everywhere falsified.

Now the case of mathematics certainly presents some peculiarities, but modern developments of the subject go to show that the ancients did not fully understand either the nature of mathematics or its analogies with the other sciences.

(1) It is a mistake, for example, to regard mathematical conceptions as ideal in a way the conceptions of other sciences are not. For though mathematical conceptions are creations of our intelligence in the sense of being conceptual ideals which the perceptual world could never realize—there are no circles or triangles in nature—so are other scientific conceptions. The notions of a beginning and an end just as much transcend experience as that of Euclidean space. A perfectly elastic body is just as ideal as a perfectly round one. The difference is in degree rather than in kind, and in the degree and amount of independence of the empirical facts to which the conceptions appear to attain.

(2) Mathematical conceptions are not, as is often supposed, *free* creations of intelligence. They were suggested by definite aspects of experience. The empirical nature of the world imperatively put certain problems to our intelligence; of those problems our current systems of mathematics proved to be the best solutions. The origin of geometry, *e.g.*, was not merely in the need for land-surveying (as the name implies), but more generally in that of describing exactly the shapes and motions of things. Hence the 'self-evident' principles of Euclidean geometry and common arithmetic are not an original possession of mankind; they are the assumptions which have established themselves either by permitting of the most convenient application to our world, or by their simplicity—which is another form of convenience. But logically and historically alike they are products of a selection among alternative assumptions. What dis-

tinguishes mathematics is the variety of applications which they admit of, and in consequence the extent to which systematic deduction from their principles can abstract from any one set of applications. The things which can be counted are far more multifarious than those which can be weighed.

(3) Nevertheless it is not true that application to experience can be dispensed with altogether. Some things there must be which can advantageously be treated *as if* they were the ideal objects of mathematics, if any system of mathematics is to be more than a play of the imagination. If experience ceased to present us with things whose behaviour could be predicted by our mathematical assumptions, which could be counted as units, and treated as having figures conformable to the postulates of Euclidean space, our mathematics would become useless and irrelevant to reality, and it would gradually seem meaningless to call them true.

Properly analysed, therefore, mathematical truth does *not* depart from the type of scientific truth. In each case we are tentatively applying a conceptual system to the interpretation of experience, and confirming its claim to truth by the success of its working.

§ 10. *Are the Predicables applicable or not?*

Only one final obscurity remains in the theory of the Predicables. Is it (1) completely relevant only to an ideal which no human knowledge has yet attained, or (2) does it claim to be applicable to the actual distinctions made by the sciences? Its advocates do not seem to have made up their minds about this, and their practice too often belies their theory. But there is good reason for their perplexity.

(1) For if the theory is only strictly true at the level of the ideal, if the only true species and genera are such as no human science has yet been able to find on earth, it will follow (*a*) that the theory will be totally devoid of that sense of truth which implies applicability to ex-

perience, and (*b*) that it will flatly contradict the procedure of the sciences. The distinctions, classifications, and definitions of the sciences are not of such an ideal character. And they are not supposed to be. They are relative to the state of our knowledge at the time, and known to be so. They are never, therefore, taken to be unimprovable; nay, the whole labour of the sciences is ever to improve the conceptual instruments they use. The sciences never say—'We will assume our conceptions to be perfect, and show you how they are immutably connected *inter se*.' To say this would be to renounce the hope of scientific progress. They say instead—'We never take any truth to be final and infallible. By assuming such and such conceptions we have solved such and such problems; by restating, modifying, and extending our conceptions we have good hopes of solving such and such further problems.'

Thus it is utterly untrue that it is by disregarding the defects of their actual concepts, and by reasoning as if the ideal level had been reached, that the sciences progress.

(2) If, on the other hand, it is assumed that the actual may be identified with the ideal, and that what is hypothetically true of the ideal distinctions holds of those in actual use, a curious nemesis overtakes the whole theory. If it is assumed that Formal Logic can lay down Definitions, state Essences, demonstrate Properties, and ascertain fixed and final truth, it can find these things nowhere but in the meaning of words. For it had disclaimed the right of extracting 'material' truth. In other words, it has to be supposed that existing language contains final truth about things. But this is to ignore the question how words got their meaning, and so to overlook that no word can convey more knowledge in its 'meaning' than was possessed by those who used it to convey their meaning. So the theory of the Predicables becomes purely verbal.

This is what actually happened. All that Formal reasoning could do was to render explicit the knowledge

already contained in the meaning of words. It could add nothing, and could make nothing of procedures by which knowledge was actually augmented and the meanings of words were altered and enlarged. Its whole procedure became trivial and futile. Its definitions became purely nominal, and the 'properties' deduced from them purely verbal. 'Essential' propositions came to mean 'tautologous.' It would triumphantly prove, *e.g.*, that all bodies were in space, because it was the 'essence' of matter to be extended. But for all information about the real behaviour of things one had to go elsewhere, to the 'accidental' properties, which were theoretically despicable, but practically useful. In short, the attempt of the Formal doctrine to become indisputable ended only in its becoming unmeaning.

CHAPTER VI

DEFINITION AND DIVISION

§ 1. *The Function of Definition and Division*

THE very intricate discussion of the Formal theory of the Predicables should have facilitated considerably criticism of the Formal doctrine of Definition and Division.

We begin by noting that this doctrine has distinct reference to real problems of knowing. We cannot think effectively without knowing clearly what we are trying to think about, nor can we handle our experience effectively without introducing into it some sort of order. Both in order to hold our meaning steadily in mind, and still more to communicate it to others, we must *define* the objects of our thought, *i.e.* lay down what we mean by them and thereby distinguish them from similar things which we do not mean. And as a consequence of this effort to obtain a definite meaning, we shall find it necessary to arrange our objects in a definite order, *i.e.* to *divide* our general subject into classes.

In scientific knowing both these demands become still more exacting. (1) Every science presupposes a preliminary delimitation of a definite subject-matter which it is the aim of the science to investigate. (2) Every science tries to divide up its subject-matter by arranging it according to a systematic scheme of classification. (3) Every science, as it develops, finds it possible to define and divide with greater and greater precision and effect, and convenient to embody its growing knowledge in a series of new divisions which classify more

perfectly, and of new definitions which express the important features of the new knowledge more compendiously and serviceably. (4) Every science, therefore, may be said to point to the ideal of a *rigid* Definition and Classification, which would be the embodiment of perfect knowledge and perfect order.

This last is the only aspect of this part of the process of knowing which the Formal theory of Definition and Division has deigned to notice, and attempted to formulate. But, unfortunately, it has not noted either that the final completion of science which it contemplated would be the cessation of science, or that its doctrines were (for this very reason) wholly inapplicable to the actual procedures of science and of ordinary thinking. The Formal doctrine everywhere will be found to have aimed at an impossible ideal, to have failed to account for the actual, and to have sunk in consequence into verbality and tautology.

§ 2. *The Traditional Doctrine*

We may begin, however, by stating the traditional doctrine. Definition, as we saw in Chap. V, §§ 3-5, was originally an integral part of the very definite theory of knowledge which engendered the Aristotelian doctrine of the Predicables. Its function was to state the *Essence* of its subject in order that there might be deduced or demonstrated from this its essential attributes or *Properties*. It was a 'making known of *the* Essence,'[1] and it was taken for granted that things *per se* had such an essence, that they could not have more than one, and that human science could state it. To state it, indeed, was easy. You had merely to state the Genus of the thing and its Difference; that fixed its place in the fixed order of nature by giving you the class to which it belonged and the marks that distinguished it from the other kinds within that group. All the rules of Definition aimed merely at enabling you to state just this, and neither more

[1] οὐσίας τις γνωρισμός, *An. Post.* ii, 3.

nor less. The demand, *e.g.*, that the definition should be *convertible* with its object, *i.e.* applicable to it and to nothing else, plainly bears this meaning. The rule that definitions should not be *negative* was defensible on the grounds that the essence could not be negative, and that the possibilities of negation were infinite. The prohibition of *tautologous* definition 'in a circle' meant that a thing's place in nature could not be fixed by its relation to itself, and reprehended a failure to fix it by its relations to its neighbours. The demand that definitions must not be in *obscure or figurative* language does indeed at first look more like a concession to the mundane requirements of human knowing, and a perception that even the loftiest science ceases to be functional when it ceases to be understood; but it is probably simpler to trace it to the conviction that the essence must always be a plain and straightforward fact.

These rules, of course, fitted in perfectly with the theory of science of which they formed part and (somewhat less well) with the procedure of the sciences which had suggested them, viz. the mathematical. Every science was conceived to start by enunciating a number of self-evident principles,[1] and by positing definitions which stated the essence of its subject-matter. After that there were a finite number of 'Properties' to be demonstrated and you had finished your science, and could shut up shop Whatever could not be demonstrated was 'accident,' and scientifically did not matter.

[1] It is here that Aristotle's advance on Plato is most evident. Plato indulged in the poetic vision of a single 'Idea of Good' from which all the sciences and the whole 'intelligible' world were to be some day deduced; to Aristotle, the discoverer of the syllogism, it was clear that this at least was logically nonsense, and that not less than *two* principles were needed to deduce anything, simply because the syllogistic form of demonstration requires two premisses. He could perceive, therefore, that the body of the sciences rested in fact on a multitude of assumptions. Unfortunately, however, the mass of philosophers have here followed Plato rather than Aristotle, and, in spite of the manifest self-contradiction of the theory, it is still customary to represent a monistic derivation from a single principle as the logical ideal of science, which, nevertheless, is to take the form of a demonstration! (cf. Chap. XXII, § 5).

§ 3. *The Limits of Definition*

Thus every science was in principle finite and capable of completion. There were a definite number of sciences, of principles, of definitions, and of propositions to be proved, and hence, of course, definite limits of Definition itself.

An upper limit to Definition was constituted by the fact that the *Summum Genus* could not be defined. For there could be no higher genus in which it could be included as a species. Neither could Definition sink below the *Infima Species*, divisible only into individuals between whom no specific difference existed. The individuals of such a kind were taken as essentially identical and scientifically equivalent. If they turned out not to be, it was merely said that they could not then belong to the same species, or that their differences touched only unessential 'accidents.' But the individual as such was indefinable,[1] because he had no 'essence'; *i.e.* none of his attributes could be regarded as more essential to his being what he was than any other. You might select a sufficiency of his qualities to distinguish him from others of his kind, and offer this as a *Description*. But this was a later concession to the merely human purpose of recognizing him, and really an inconsistency. For science as such could not be interested in the accidental nor in the individual as such.

It was admitted, however, that there were certain difficulties inherent in the doctrine. (1) How, for example, was the initial delimitation of subjects and the positing of the primary definitions to be effected, or a dispute about them to be settled? The answers in detail were necessarily vague, but one could at least lay down the principle of an appeal to the faculty of Intuitive Reason (*νοῦς*), and posit it as an infallible authority. Such intuitions had

[1] 'Simple' qualities are also regarded as 'indefinable.' It is said that qualities like 'hot,' 'red,' 'pleasant,' must be experienced to be known. But the reason is a different one. They do not need defining, because as a rule they are such familiar experiences. That the same term 'indefinable' should be used to describe their nature really evinces a defect in the logical terminology.

in any case to be postulated, in order to prop up the theory of the Syllogism, which demanded an adequate supply of absolutely certain premisses which were above (or beyond) proof (cf. Chap. XVIII, § 3). Whoever was unwilling to chime in with a logician's intuitions might further be denounced as a sceptic who was attempting to undermine the foundations of all reasoning. In this way, then, these objections might be removed, or at least the objectors suppressed.

(2) Those, on the other hand, which arose out of the actual functioning of definitions could not but make themselves felt. Aristotle himself observed that alongside of the *real* definitions which scientifically stated the essence, there existed *nominal* definitions which appeared to state only the meaning of words, and asserted nothing as to the existence of corresponding objects.

His treatment of them was obscure, though hardly deserving of the nemesis which overtook it. For, owing to the unfortunate assumption that Logic need not consider the genesis and development of meaning and might take the accepted meanings as fixed and final, it befell that Aristotle's '*real*' definitions became in practice nominal, whereas his '*nominal*' definitions actually succeeded in conveying real information (cf. Chap. V, § 10). For it was only by defining man by his 'essence' as a 'rational animal' that the Aristotelian could reach an indisputable platitude no one would trouble to deny, while he had failed to grasp that any definition which meant something because it had a bearing on a real question, was for that very reason disputable. Thus verbalism or inapplicability once more forms the alternative past which Formal Logic does not find a way.

§ 4. *Criticism of the Traditional Doctrine*

That this is inevitable will appear more clearly when we proceed to a systematic criticism of the doctrine. Its unjustified assumptions are those which are always met with in Formal Logic. It was assumed that Logic is

concerned, not with the actual procedure of human knowing, but with an ideal of Definition which certain definitions were supposed to exemplify. Because definitions could be ideally conceived as precise and complete and unchangeable, and because certain mathematical definitions were thought to possess these admirable qualities, it was assumed that all the other qualities of definitions and all the qualities of other definitions were logically negligible. Because Definition might be defined [1] as 'the exposition of *the* connotation of a term,' it was assumed to be unnecessary and unworthy of Logic to investigate how terms acquired, retained, and modified their meanings. And because the only terms of which the meanings could approximately be regarded as possessed of these desiderata and as known to all, were the meanings of words in common use, Logic was debarred from the testing of doubtful definitions, the establishment of which would lead to an extension of knowledge, and restricted to the defining of what every one was aware of already.

(1) Inevitably, therefore, Formal Definition becomes utterly inapplicable to the procedures of actual knowing. For it postulates a knowledge of the 'essence' which is not in fact either possible or desirable. In no science are we ever able to begin with knowing what is important ('essential') to the being of our subject. This is precisely what we are trying to find out. Even if, therefore, it has an 'essence,' that essence cannot be formulated. Our initial definitions, therefore, cannot but be provisional, and as our knowledge grows they must be modified. We cannot even say that we start with *nominal* definitions which are provisional, and finish with *real* which are final. For we never *finish* at all. It is in flat contradiction with the method of science to assume a limit to its progress. Finality may appeal to us as mortals, but it cannot be our ideal as scientists. We must decline to arrest, even in thought, the continuous advance in knowledge. Hence a theory of Definition which postulates

[1] Tautologically, because (Chap. III, § 3) the 'connotation' can only be distinguished from the rest of the meaning by means of the notion of definition, viz. as that part of the total meaning which is used in the definition.

finality is *not* the ideal of scientific definition, any more than it is applicable to actual definitions.

It is not applicable even to mathematics, though Aristotle doubtless thought so. Not even in mathematics is it true that the meanings of conceptions remain unaffected by the progress of the science. What the 'unit' has meant has been altered by every step in the development of arithmetic; its meaning changed when subtraction was added to addition, when multiplication, division, and fractions were invented, when $\sqrt{-1}$ became a permissible symbol. The meaning of 'triangle,' similarly, became ambiguous, and Euclid's definition thereof inadequate, when the conceptions of spherical and non-Euclidean 'triangles' were evolved. It may indeed have been that in some of these cases it was not judged expedient to change the verbal formulations of these meanings in Euclid's definitions. But if on this account Formal Logic imagines that the meaning of mathematical conceptions does not change, it is merely exhibiting once more its characteristic confusion of the ideal with the verbal.

(2) Even on its own assumptions, however, the procedure of Formal Definition seems indefensible. It fails to establish even the ideal unity of the definition. It assumes that when the 'essence' of a thing has been completely stated, there cannot be more than *one* definition finally possible. But the very nature of the process it employs entails the consequence that a plurality of definitions of the same thing must always be conceivable. For no definition ever states the sum total of the qualities that seem to go to the being of a thing, and the impossibility of stating this sum is precisely the reason for declaring the individual indefinable.[1] All definition rests

[1] Quite illogically, be it noted. For if both the 'definition' of the kind and the 'description' of the individual are in fact selections from the sum total of their qualities, the distinction between definition and description vanishes. In neither case do we *wish* to enumerate this total, but in the individual's case we either know, or are interested in, more of the real facts. We see that *all* his qualities go to make him what he is and that none are irrelevant: in the case of the 'kind' we either do not grasp this or consider it irrelevant for our purpose of grouping individuals in classes. But to declare on this account that our knowledge of the individual is logically on an inferior plane is a paradox. We can

on a *selection* of the 'essence' from among the 'properties,' and so involves a human interference, and a risk of error. In most subjects the choice is very wide, but it exists even in the apparently rigid definitions of mathematics. We have, *e.g.*, a choice whether we shall take the postulate of parallels as the ultimate differentia of Euclidean space and thereupon demonstrate the equality of the angles of a triangle to two right angles, or assume the latter as our necessary postulate and prove the postulate of parallels. Either of these assumptions will serve the purpose of exploring the properties of Euclidean space, and neither, therefore, can be regarded as *the* Definition thereof. In the more concrete sciences it is well understood that one definition may be proper for one purpose, another for another. For the purposes of economics, for example, it may be right to conceive man as a wealth-producing or as a wealth-consuming animal, as essentially a worker or an idler, as actuated by necessity or by desire, etc. In short, more or less of an apparently arbitrary selectiveness goes to the making of every definition, and if it be held that arbitrariness and selectiveness vitiate the objectivity of truth, it is clear that the Formal doctrine of essence stands self-condemned.

(3) Its failure to consider the question, viz. how far human purposes and preferences must on the one hand constitute, and on the other vitiate, our definitions, is perhaps the most fatal defect in the Formal doctrine. Yet it is easy to see that once this question is admitted, there would seem to be no end to the modifications it entails, and that therefore the instinct of self-preservation urges Formal Logic to be blind to these difficulties. For if no definitions are absolute, if all are due to, and relative to, the purposes of an inquiry and an inquirer, there may have to be as many definitions as there are purposes, and the neat finality of the Aristotelian scheme is shattered beyond repair. The fear of the consequences of such relativity is indeed as unreasonable and chimerical as the

distinguish individuals not because we know *less*, but because we know *more*, about them than about 'kinds' (cf. Chap. II, § 6).

fear lest the recognition of the relativity of motion should render all motions incalculable and unknowable ; but it is quite consistent in Formal Logic to entertain it. For after systematically ruling out all reference to the purposes of knowing at the outset (cf. Chap. I), it could not afford to recognize them later, even in order to understand the real nature of Definition.

§ 5. *The Real Nature of Definition*

The real nature of the logical import of Definition should by now be fairly clear. *Relevance to purpose* is the primary requisite in a good definition, and that which governs all its other features. For definitions are needed, and are made, in order to make clear what a subject under discussion or investigation means, and are always intended to bear on some problem or dispute. It is impossible to inquire or discuss effectively unless we understand or agree upon what is the point in question ; it is trivial and superfluous to define what is not in dispute ; and it is irrelevant to define what is not important for the purpose in hand. The 'essence,' therefore, which every definition tries to state is simply the point which it is for the time being important to elucidate. It follows that the essences and definitions of things are necessarily plural, variable, and 'relative,' and never 'absolute.' But they are all the better for this. They are thereby rendered adjustable to our purposes and applicable to the problems of knowing. A single, unmistakable, and absolute definition of a thing, true without reference to any context, would have to be one that would serve for *any* purpose for which it is convenient or possible to use the term. Such a definition is barely conceivable, but quite incredible, and assuredly not extant. To restrict 'logic' to such definitions is to render it inapplicable, and to leave the plurality of definitions in actual use without the benefits of logical discrimination and correction.

It follows no less clearly from the primary purpose of

Definition that all definitions must be nominal. They must be intended to *label* an object under inquiry or dispute in order to facilitate its investigation. By giving it a name, and explaining that name in terms already understood (this is why obscurity is objectionable!), we make it something that can be referred to and debated, and perhaps agreed upon. We render possible *a common* meaning, and in all attempts at communicating opinion this is an indispensable preliminary. The disputants who discovered in the end that 'my "God" is your "Devil"!' could have avoided much unprofitable wrangling by starting with purely 'nominal' definitions of 'God' and 'Devil.'

But 'nominal' definitions are never merely nominal. If I define a 'Grabberwock' as 'an etherealization of a Brolliwag,' and deny that I am making personal remarks about any one, I shall be understood to be either joking or insane. In serious inquiry nominal definitions are only made to be used. And if they are not found to be applicable to objects, and so serviceable, they are rejected or amended forthwith. Every nominal definition, therefore, must be intended to give us *some* grip on reality, and be to *some* extent real, even though all it enables us to do (or even aims at doing) is really to understand the meaning of a view we consider utterly mistaken. Hence it may be true or false as fulfilling this function, and, if true, it will convey real information as to the state of another's mind. The only definitions which might be considered purely nominal, because they are wholly inapplicable to reality, would be the 'real' definitions of logic, and even these some logicians appear to believe in.

The working definitions of the sciences, however, usually possess far more reality than this. Being the fruits of long experience and much experiment, their initial crudities have been polished away and forgotten; they have had most of the nonsense knocked out of them, and have become fairly adequate for the purposes for which they are used. But for this very reason they can never be trusted to cope with new circumstances which

were not within the purview of their framers, and always remain subject to revision in the light of fresh knowledge. It is never, therefore, a sound scientific procedure to argue from an accepted definition against new facts which challenge the correctness of the definition. When, *e.g.*, facts are brought to light which point to a new theory of 'species' or of 'truth,' they cannot be disposed of by complaining that the words 'species' and 'truth' have always hitherto been defined and understood in a way which rules out such facts. The attempt to rule out novelty by definition is like the attempt to make a law immutable by including in it a clause to make death the penalty for an attempt to repeal the law; just as to repeal the law repeals the penalty, so to establish the new facts *ipso facto* invalidates the old definition. In such cases we are forced to perceive how inadequate is this traditional doctrine that the denotation ('extension') of a term depends on its connotation, and not *vice versa*. It is often more urgent, and better science, to bring a new fact under an accepted definition, *e.g.* to include a black bird under the genus 'swan,' or to extend the 'Atomic' Theory by splitting the atom into 'electrons,' than to preserve unmodified an old definition which declared that swans are 'essentially' white, or that an atom is essentially indivisible.

The flexible, corrigible, relative definition, therefore, which is always for a purpose and for use, and never for show, is the sort which science needs and devises. Formal Logic declines to provide this sort of Definition, or to have anything to say to it. But this is to say that Formal Logic never descends to earth and has no concern with real definitions or real knowing.

§ 6. *Division*

Division is usually defined as the exposition of the denotation of a term, and we have seen (§ 1) that it represents the logician's conception of dealing with the practical problem of ordering experiences, which in science

becomes the problem of Classification. In science this problem is very important and leads to very intricate and elaborate schemes of Classification; but logical Division does not aspire to anything so systematic, and is content to use only the two ideas of genus and species and to add that these must be understood relatively. It is, in fact, an attempt at the classification of the things, or more strictly of *sorts of things*, to which a Formal definition applies, and as we have already studied the difficulty of finding such things, we shall not expect too much from its doctrine.

The Formal logician, however, blissfully oblivious of the fact that in defining his subject he had made abstraction from the problem of application, plunges hopefully into a subject which taxes the resources of every science, and gaily lays down the rules for a perfect division. A genus is to be taken and cut up into its species. To do this neatly a single principle or *fundamentum divisionis* is to be used (at a time). When this is done, the genus will be divided exhaustively, *i.e.* the whole of it will be divided into species which will exclude each other without any transitional forms and there will be no overlapping and no *cross division*.

The whole doctrine seems so simple as to be almost silly. In order, therefore, to make it feel scientific, the logician garnishes it with a few technicalities, calling the species *membra dividentia* and the genus the *totum divisum*, and pointing out that it must be predicable of each of its dividing members, and adding a pretty superfluous distinction between logical division and metaphysical and physical ('partition'). His illustrations of the value of logical division are usually of a comical order. The division of food into 'fish, flesh, fowl, and good red herring' is used to illustrate the horrors of *Cross Division*, and the 'University, family and pork butcher' in the Cowley Road at Oxford is solemnly censured as illogical, without regard either to the excellence of the advertisement or the ease with which the joke is seen, and seen through, by the obtusest intelligence. It is taken for

granted that such trifling somehow has a bearing on the hard work of the sciences.

§ 7. *The Difficulties of Division*

Yet from the first it had been impossible to overlook grave defects in the Formal doctrine. Inasmuch as Division had been advocated as the method of science by Plato, it had the advantage of being at once criticized by Aristotle, and the Formal account of it got into difficulties so soon as the questions were raised—How do we come by our *fundamenta divisionis*, and what guarantees the exhaustiveness of our divisions? Aristotle had the acuteness to see that the principles on which divisions proceeded were always the products of a selection, which seemed arbitrary, and (in a dispute) had to be granted. He consequently denounced Plato's method as sheer question-begging, and as a 'weak' anticipation of his own syllogistic method, which alone, he held, could compel assent and really advance scientifically.[1]

Aristotle's criticism was unanswerable, but for this very reason failed to affect the Formal doctrine. It raised too large a question to be faced. The all-pervasive selectiveness of real thinking had been too systematically overlooked by the Formal account of thought for a casual appeal to it to lead to a radical reform. Indeed Aristotle himself had not seen the full scope of his criticism. The formation of a genus to be divided is itself a signal example of human selectiveness, in which 'arbitrariness' is inevitable and error is always possible. The only possible way of meeting the objection, therefore, would have been to admit the selectiveness of thought but to deny that it was necessarily a source of error, and to declare that it was precisely the relevance of a selection to the purpose of some inquiry that rendered a division needful, possible, and right. But such audacity Formal Logic could not have dreamt of.

Consequently the difficulty about exhaustiveness was

[1] *Anal. Prior.* I, 31.

more immediately productive of logical results. Clearly a logical division was worthless, if the *fundamentum* used did *not* divide the species neatly, either because it occurred in several divisions or because it left a refractory remainder to which the *fundamentum* would not apply. The logician naturally felt towards such annoying anomalies very much like a regular party politician towards third parties and 'mugwumps.' How, then, was a *fundamentum* to be secured which would function in the ideal way postulated?

Logicians gave a twofold answer. In the first place, they admitted that 'material' knowledge had often to be used in making good divisions, which was in effect to renounce the logical ideal of Division and to reduce it to scientific classification; in the second, they put forward *Dichotomy* as the ideal of Logical Division.

§ 8. *Classification* v. *Division*

But they did not at first perceive how utterly futile both these expedients were. If material knowledge was once admitted to be relevant to the logical problem of Division, the logician became a superfluity and his authority was superseded.

(1) The scientific expert could always tell him that his intervention was an impertinence, that he himself was alone competent to judge of the manner in which it was proper to divide his subject, and that the Formal defects which logicians detected in his divisions were only verbal and rested upon ignorance. He might say: 'It is quite true that technically and verbally a division of rectilinear figures into triangles, quadrilaterals, and polygons uses two *fundamenta*, the relations of the sides and of the angles, and that the division of triangles into scalene, isosceles, and equilateral is vicious because the third is a case of the second. But if you knew any geometry, you would see that this does not matter and that the divisions are in fact convenient and exhaustive.'

(2) Not only would the logician be ruled out, but he would have to submit to an important correction of his logical ideal. For the scientist discovers that in point of fact there is no end to scientific classifications. His classes have constantly to be subdivided, and reconsidered in the light of later knowledge. Exhaustive divisions are hardly obtainable, and he therefore declines to postulate them with the ignorant *insouciance* of the logician. Nature, he finds, is extremely complicated and elusive, and to the simple rules he naturally starts with he always finds exceptions. Many subjects seem all compact of transitional forms and individual variations, and clean-cut divisions are everywhere more or less artificial. They are human devices for coping with the exuberance of reality. Nature sometimes tolerates our passion for them, but they are never to be read off from her countenance. Hence the scientist habitually operates with more than one principle of classification at a time, and is constantly revising his classifications as his knowledge grows. He ceases to think of them as final; he realizes that they are convenient and indispensable, but subject to correction. Thus the logical inference from the actual practice of the sciences is *not* that exhaustive division must be postulated as the ideal, but that in any applicable conception of the function of classification it must be explicitly borne in mind that the presumption of exhaustiveness must never be allowed to prevail against any evidence that in point of fact the old division had assumed exhaustiveness too soon.

§ 9. *Dichotomy*

It would seem, then, that Formal Logic's only refuge is in Dichotomy, which is the truly Formal device for securing exhaustiveness. Let us divide the genus A into B and not-B, and assure ourselves (by the Principle of Excluded Middle, Chap. X, § 7) that now no fish can escape from our net. After that B may be once more divided into C and not-C, and so we go on merrily

until we have analysed out all the species, and that which is not-B, not-C, and not-D, etc., is = 0.

Nothing at first sight could be simpler or neater than Dichotomy. Yet nothing, even in Formal Logic, is really more futile. It does not remove a single one of the difficulties it was devised to meet.

(1) It does not secure exhaustiveness. For there is no Formal way of making sure that the class at which division stops, say not-B-not-C-not-D, does in fact = 0. The dichotomist never gets a Formal signal to tell him when to stop, and may exhaust his ingenuity in suggesting *fundamenta*, but never his subject.

(2) The fundamenta used remain as 'arbitrary' and 'precarious' as ever. *I.e.* they still remain dependent on selection. Why should one begin by dividing into B and not-B rather than into Z and not-Z? And why should either B or Z be relevant to a really workable classification of the subject?

(3) If there are no means of securing relevance in the principles of Division, Dichotomy becomes positively farcical. One can go on for ever dividing non-existent subjects into fantastic classes by irrelevant *fundamenta*. 'Fairies,' for example, might be divided into 'liberal' and 'not-liberal,' 'spondaic' and 'not-spondaic,' 'hyperbolic' and 'not-hyperbolic,' and no lover of useless research could be stopped from becoming the greatest authority on such dichotomies, and probably a professor. But if dichotomies have to be relevant, if they are to mean anything, it is clear that the selection of their *fundamenta* must be guided by 'material' knowledge, and that even Dichotomy is not really Formal.

(4) In any *applicable* sense it is not even true that it may be divided into B and not-B. Dogs, for example, may all be watch-dogs or not-watch-dogs; but it would be unsafe to rely on this Formal division in practice. For if your 'watch-dog' happens to be also a sleeping dog, he may fail to function as a watch-dog without ceasing technically to be one (cf. Chap. II, § 11). It seems fair to conclude, therefore, that the value of Dichotomy is illusory.

§ 10. *Conclusions*

What, then, are the conclusions to which our study of the Formal theory of Definition and Division leads? Not merely is it pervaded with difficulties and incongruities, not merely is it incapable of application and impotent to help science in dealing with the real problems of definition and classification, but it is positively misleading and obstructive. Not merely does it suggest no means of reaching its logical ideal, but it puts forward a false ideal, which, if it could be realized, would be fatal to the progress of knowledge. Fortunately its suggestions were so impracticable that they had to be ignored by all who really wished to know; but it has done incalculable harm by fostering self-satisfaction in those who did not wish to know, but only to have a good excuse for doing nothing, as arm-chair critics of sciences they did not trouble to acquire. This is why the Middle Ages, which were the ages of faith not in Christianity so much as in Formal Logic, when men really believed in it and tried to live by it, were so incompatible with scientific progress.

CHAPTER VII

THE THEORY OF IDEAS

§ 1. *Ideas, Universals, and Concepts*

WE have already been compelled to mention somewhat mysterious entities, variously called *Concepts* or *Universals* (or *Ideas*, or *General Notions*, or *Conceptions*), which the logician is wont to treat as the bricks out of which all logical structures are built. Their discussion properly belongs to the second part of Logic, as their explanation depends on the theory of Judgment; but though they are functional only in the act of judging, they were originally conceived, and are still persistently treated, as having an independent existence. This existence it is not possible to render really intelligible on the assumptions commonly made; hence the theory of Ideas has produced enormous masses of controversy, alike in logic and in metaphysics, and is largely responsible for the prevalent confusion of these two subjects, and for the difficulty of philosophy generally. Yet there was a time when it might claim to rank as a great discovery. A glance at the history of the subject will not only show this, but also why and where it went astray.

§ 2. *Plato's Theory of 'Ideas'*

For this purpose it will suffice to begin with Plato.[1] Plato appears to have been enormously impressed in his

[1] Socrates is usually credited with the discovery of the Ideas. But we have no sufficient evidence to show how he conceived them. All the accounts of his doctrine are at second hand, and moreover vitiated by a purpose. The 'Socrates'

youth by the Heraclitean doctrine of the all-pervasiveness of change. Although in itself this doctrine was probably intended as a piece of physics or of metaphysics, it seemed to him to carry logical implications which were fatal to the existence of knowledge. For if everything was changing, so also were the meanings of terms, and if there was no identity of meaning, there was no possibility of meaning anything. Every truth was falsified in the very utterance. To say that A was B no longer excluded A's being not-A and B's being not-B, nor even A's not being B. Thus all meaning was dissolved away in the universal flux. While conceding, therefore, that the Heraclitean description applied to phenomena as they appeared to the senses, Plato thought that this only rendered it the more imperative to seek for stability and repose in some fixed suprasensible order which might be apprehended by the reason.

He found what he desired in the stable meanings of words to which Socrates had called attention. The 'good' did not seem to cease to be good as good things became bad, nor the 'hot' to be hot as hot things cooled; hence it was easy to infer that such terms immutably preserved their meanings. The good, the hot, the beautiful, etc., in short, every term that could be predicated, *per se* (*i.e.* apart from their applications) were eternal and immutable entities, unaffected by the seething flow of appearances in which nothing endured or remained identical with itself. The use of predication, then, elevated man above the flux of the phenomenal, and attested the existence of a higher order than that of sense-perception. This was Plato's first discovery in the borderland between

of Aristophanes is a hero of comic opera (*The Clouds*). The next in order of seniority, that of Antisthenes, the inventor of the 'Socratic' dialogue, has perished, though Xenophon's 'Socrates' may reproduce many of his salient features (cf. Joel's *Der echte und der xenophontische Sokrates*). Plato's is the chief of the literary Socrateses, but cannot be taken as authentic without Boswellizing Plato, and tarnishing beyond repair the glory of the greatest Greek philosopher. Aristotle, though he probably gives the most trustworthy estimate of the place of Socrates in philosophy when he represents him as a logician intent only on discovering definitions of universals by inductive argument, is already a retailer of the tradition which the school of Plato had made. Hence it is safer to consider the theory of Ideas in its fully developed Platonic form, in which it already exhibits its characteristic duality of function as a logic and as a metaphysic.

logic and metaphysics. To describe these suprasensible sublimated meanings he selected from the language of the artistically-minded Greeks the terms 'Forms' or 'Ideas,' without apparently observing how thoroughly sensuous were the words with which he hoped to wing his way to the Empyrean.

He made, however, a second great discovery by perceiving that a logical application could be given to the metaphysical doctrine of Parmenides that 'only Being is,' and that thereby he could not only escape from the Heraclitean flux, but (in theory at least) secure for himself an eternal repose in the first (and most rational) of the philosophic 'heavens.' He noticed that all predication employs the term 'is,' even in describing change. The interpretation he put upon this fact was that Being alone is knowable, and that Becoming is as such self-contradictory. Whatever 'becomes,' therefore (*i.e.* changes, or is in process), is not completely real. Whatever 'becomes' both is and is not what it was and what it turns into. It cannot be said to 'be,' but only to be struggling from not-being towards being. By this corollary from the forms of speech the whole sensible world is, in principle, condemned. It is not truly real. It 'flounders' in a no-man's land between being and not-being. Whatever reality it can be said to have is secondary, and somehow derived from the Ideas which alone truly are and unchangingly abide, whereof the knowledge is the one thing worth man's knowing. Thus the popular belief in the reality of sensible things is at bottom an illusion. For there are not *many* things, but only *one* 'form' for each predicable kind, bound up with every other 'form' in one unchanging system.

§ 3. *The Difficulties of the Ideal Theory*

Every step in this argument seemed to Plato so irrefragable that the validity of reason was irrevocably pledged to its acceptance. Yet he was fully aware of certain fundamental difficulties, which he was candid enough to

state, though he felt himself unable to remove them. After all, the sensible world was not wholly non-existent. It had a delusive show of existence, and though it could not be strictly 'known,' it could be 'opined about' in the light somehow reflected on to it from the archetypal world of 'Forms.' How could this be? How could the sensible 'participate in,' 'imitate,' or 'copy' the Ideas? how could the Ideas be 'models' 'present' in the flux?[1]

These questions had to be answered, for unless there could be conceived a connexion between the Ideas and the sensible world, the Ideas would be otiose and unable to shed any light on the sensible world, which, after all, was the oppressive puzzle of life. But Plato never found an answer which satisfied even himself. His original notion of the logical function of concepts was infected with deep-seated errors which rendered the problem insoluble for all who had accepted it. His successors and critics, therefore, had an easy task in exposing the difficulties he had admitted, but an impossible one in trying to escape from them themselves.[2]

§ 4. *Aristotle* v. *Plato*

Aristotle, disgusted with Platonism by the injustice of the academic scandal which promoted not the most eminent of Plato's pupils to the headship of the Academy, but his nephew, led the way. He justly insisted that if the Ideas were 'transcendent,' set apart and separated from the phenomenal world, they explained nothing. The Ideas, or, as he preferred to call them, 'universals,' must be 'immanent,' a unity of the kind in the many particulars which exemplify the kind, common to them

[1] If Plato had not been in such haste to fly to metaphysics, and willing to bestow more attention on the logical problem, he would probably have perceived that precisely analogous difficulties are involved in the problem how, supposing the Ideas to exist, they can be known *by us*. For just as sensible realities are bad imitations of the true realities, so our ideas are imperfect imitations of the Ideas, disfigured by error and subject to change. Plato does not seem to have realized this problem, though in the *Theaetetus* he confesses himself unable to understand the existence of error (cf. my *Plato or Protagoras?*).

[2] Not that they tried very hard for the most part. As a rule, they evince a much shallower sense of the difficulties of the Ideal Theory.

and constituting their essence. The nature of universals he conceived on the biological model of the doctrine of fixed species as unaffected by individual variation.

It was easy to say this, but not to explain how precisely the immanent universal could perform its function. Beyond assuming that individuals of a kind differed only in their 'accidents,' and that these were logically unimportant, Aristotle made no serious attempt to consider how the universal pervaded its particulars, or to solve the difficulties Plato had formulated in the *Parmenides*. Indeed, whenever he is off his guard he relapses into the Platonic language, and returns to the very phraseology he had so strenuously denounced.[1] In short, he is far too much of a Platonist in his theory of knowledge to be able to correct his master.

§ 5. *Realism*

Plato and Aristotle are the great representatives of the logical doctrine called *Realism*.[2] In both the possibility of knowledge is made to depend on the assumption of Ideas or universals. In both the reality of these universals is (on the whole) superior to that of the particulars.[3] In neither is the relation of particulars to universals properly cleared up. In both the logical problem of 'Why do we in knowing use universals?' is inextricably mixed up with the metaphysical problem of 'Are there real kinds in nature, and why does it work to assume them?' Compared with these essential agreements the differences

[1] Thus he calls the universal 'a one alongside of the many' (where he is dealing with Plato's original problem of getting stability out of the flux of perceptions) in *Anal. Post.* ii. 19, and in *De Anima*, iii. 4, makes 'reason' transcendent in a peculiarly indefensible way.

[2] This logical 'realism' must be carefully distinguished from metaphysical realism. In metaphysics 'realism' is opposed to 'idealism' and not to 'nominalism.' It asserts that perceived objects are 'independent' of their percipients, or that a real world exists whether there exists a mind to know it or not. How different these uses are is shown by the fact that, though Plato and Aristotle are both 'realists' in logic, Plato would be called an 'idealist' and Aristotle a 'realist' in metaphysics.

[3] Aristotle, it is true, makes some reservations on this point and tends in his metaphysics to treat the individual as the primary reality (cf. Chap. IV, § 3) But even in the *Metaphysics* the individual is described, for the purposes of knowing, as a concretion of two universals, 'matter' and 'form.'

between them are secondary. Aristotle has only *one* real world, in which universals are somehow immanent: Plato has *two*, which are absolutely separated and yet somehow connected; or, if he has only one, his real world is, at any rate, *not* the real world of Aristotle and of common-sense, which he regards as an illusion.

Hence in the Middle Ages they could both be cited as the champions of Realism and boiled down compendiously to the two formulas, *universalia ante rem* (Plato) and *universalia in re* (Aristotle), where *res* means the concrete particular, the reality of which common-sense everywhere takes for granted.

§ 6. *Nominalism*

But from the nature of the case this doctrine could not remain uncontested. Realism had never succeeded in giving a satisfactory, or even a coherent, account of how the universal could be immanent in the particular. Nor had it even attempted to explain in detail the specification of genera and in what way genera could be real which possessed all the incompatible attributes of its species, how, *e.g.*, 'the triangle' could be equiangular, rectangular, and isosceles, etc., or how the infinite plurality of ideal triangles was compatible with the unity of the universal. If, therefore, the working assumption of ordinary life was right as against Plato, and particulars really existed and were objects of knowledge, it was possible to hold that they *alone* really existed (as Aristotle had given occasion to think), and that universals were figments. So far from being prior to the particulars, they were *ex post facto* devices to describe in words the points of agreement between individuals. They were, therefore, *post rem*, nay, were verbal conveniences, *nomina* or *flatus vocis* and nothing more. They were wholly man-made and nothing in reality corresponded to them. This doctrine was called *Nominalism*, and is first traceable in some objections made by Antisthenes to Plato's theory when it was first propounded. It became a

burning question [1] in the medieval schools with Roscellinus, who was condemned at Soissons in 1092, but triumphed with William of Occam in the fourteenth century.

§ 7. *Conceptualism*

Conceptualism may be conceived as a less extreme (or perhaps less distorted) form of Nominalism. Universals are not mere words, but are admitted to be real as psychic facts, *universalia in mente*. They are regarded as the instruments whereby our thought classifies the overwhelming variety of phenomena. It is necessary to go behind words to their 'meanings,' and permissible to ask how and why that meaning serves its purpose. Nay, in its better forms, Conceptualism recognized that concepts or 'ideas' exist only in the judgment (*in sermone*), though it thought it incumbent on itself to construe their existence on the analogy of physical things and to conceive them as distinct mental entities, which though 'universal' *per se* might yet be 'individualized' variously in their applications. In so doing it was perpetrating a needless confusion between the logical and the psychological senses of the word 'idea.' If the 'idea' as the logical meaning is identified with the psychological 'idea' or *mental image*, the conceptualist may well be perplexed by the nominalist's question how it is possible to have a 'general idea' of triangle which is "neither equilateral, isocrural, nor scalene, but all and none of these at once." [2] This confusion is, however, quite superfluous. For though it may be true that mental images accompany all thinking, and it is true that if they do they are as particular as things, yet it does not follow that they have any special logical importance or that the act of meaning essentially depends on them. For not only is it denied of late by good

[1] Because it was said to undermine the doctrine of the Trinity, and to lead to tritheism. For how could the three Persons any longer have a common 'essence'?

[2] Locke's *Essay*, iv. 7, 8; and cf. Berkeley, *Princ. of Hum. Know.* § 13. This difficulty exists only for Realism.

psychologists that imagery always accompanies thought, but there is no correlation between the wealth and intensity of the imagery and of the thought. And anyhow the imagery is logically irrelevant. It is never the particular fluctuating imagery we may have in judging that we *mean*. I may in judging about dogs have in my mind the visual image of a yellow dog, and yet convey my meaning to another whose dog-image is black, provided that we both know that the colour of dogs is variable and unessential. Hence the impossibility, signalized by Berkeley, of forming images which are not individual, is no argument in favour of Nominalism as against Conceptualism.

§ 8. *The Errors of Realism, Nominalism, and Conceptualism*

The realistic doctrine of universals has a great attraction for unclear minds, which are fascinated by its very defects. It is no objection in their eyes that Realism cannot be thought out into a coherent account of the relation of universals to particulars, that it thoroughly confuses its proper logical problem of understanding the working of 'ideas' in thinking with the metaphysical problem of discovering real kinds in nature, and that it cannot explain how its supposition that universals exist *per se* forms any guarantee of the concepts, good, bad, and indifferent, which we use. But in scientific minds the cause of Realism has been ruined by the further study of the very facts to which it first appealed. It has become incompatible with science, and Darwinism has administered the *coup de grâce*. The naïve objectivism of attributing to the core of reality every device of scientific manipulation (cf. Chap. V, § 7) has become abhorrent to modern science, which demands the utmost freedom to use whatever methods and whatever hypotheses will yield results, and finds it inconvenient to have to put a metaphysical construction on all its passing expedients. It prefers to believe, therefore, in the sub-

jectivity of 'universals,' which has been conclusively established by Darwinism in the crucial case of biological species (Chap. V, § 8).

It is, however, scientifically very instructive to trace back Realism to the point where first it went astray. The source of the error is to be found in Plato's original assumptions. (1) Though it is true that everything is changing, it is false that therefore the flux is unknowable. For things are changing at very different rates, and it is possible to measure the more rapid changes by things which, for all practical and scientific purposes, may be taken as stable. It is the use of such methods that enables science to smile at the idea that the changing cannot be known. (2) It is false, therefore, that the fluid can only be known by the rigid. (3) Though it is true that 'Ideas' (properly understood) play an important part in knowing, it is false that they belong to a supra-sensible world of superior reality. Not only is Aristotelian realism right in conceiving them as immanent in the phenomenal world, but they are *just as real, and as phenomenal*, as the minds that harbour them. (4) They participate in consequence in the general characteristics of reality, and are not exempt from change. Human ideas are originated, grow, change, and perish, like everything else. To postulate another kind of Ideas, defined to be absolutely immutable, is futile. For this would only produce a further insoluble problem as to how these Ideas are related to our ideas, and how this relation could be known to us, even if it existed. (5) It is essential to the logical function of Ideas that they should *not* be immutable, but, on the contrary, should be modifiable by use. For only so can they be prevented from getting out of date as our knowledge grows. (6) It is, moreover, an undeniable and literal fact that every time an 'idea' is used in a real judgment its meaning *is* modified thereby.

For no judgment would be worth making nor could it rationally be made, if it did not enunciate or communicate some truth that was (or seemed) *new* to the

parties concerned. Hence ever afterwards the meaning of its terms would be modified for them by the fact that the judgment had brought them into conjunction (cf. Chap. XI, § 11). Of course in ordinary judgments, that serve a passing purpose, the modification is so slight as to be hardly perceptible; it makes very little difference to my notion of 'dog' that any particular dog should have contributed to its meaning. But in many cases the difference is felt; our first experiences that 'this is love, or 'mania,' or 'seasickness' probably add enormously to the meaning of their terms. And of course judgments which embody new discoveries may not only affect their terms, but revolutionize the state of a science, and convey novelty to all the world.[1]

Realism, then, has thoroughly misinterpreted the function of the concept. It has noted the facts that thinking uses concepts and that the use of concepts is the predominant feature in human intelligence, but has at once wandered off on a metaphysical interpretation of these facts which is logically irrelevant, without telling us either what concepts are or why they work. Nor does it explain how true universals are to be discriminated from false.

Nominalism has value as a protest against Realism,

[1] It will not do to regard these cases as different in principle, and the former sort of novelty as only 'psychological,' while the latter alone is 'logical.' For logical novelty is only novelty to *all* individuals. Or else, if we try to conceive it as absolute, it becomes impossible altogether. *Sub specie aeternitatis* there cannot be novelties anyhow. In the closed circle of the Platonic Ideas, for example, there can be a coming into being as little as a passing away. Everything is eternally frozen in an absolutely rigid scheme of relations. Hence all novelty, reasoning, and inference necessarily pertain only to the apprehension of this scheme by human minds, and form part of their psychology. Plato himself hints as much by using the same term δόξα both for 'opinion' and for judgment. This implies that 'judgment' is not a matter of 'knowledge,' and is strictly extra-logical (cf. Chap. XI, § 8). The more consistent among Formal logicians have had the acumen to perceive this. Mr. H. A. Prichard, for example, who follows Plato in drawing a rigid line between 'opinion' and 'knowledge,' quite rightly stigmatizes as 'fallacious' the question 'What is judgment?' (*Mind*, No. 76, p. 543 *n.*). But he certainly goes beyond Plato in regarding as equally fallacious the question 'What is the relation of the universal to the particular?' For Plato's writings show that he had seriously concerned himself with this question, though he too could not solve it. In actual human thinking, on the other hand, which is another affair altogether, the mutual adjustment of particular ('case') and universal ('law') is the essence of all reasoning (cf. Chap. XXI, § 5).

but beyond this tells us little. It is obvious that words are used to convey ideas, but it is a mistake to reduce ideas to words. For words are framed to express ideas, and languages grow with the thoughts of their users. Moreover, Nominalism also fails to tell us how words obtain and convey their meaning, and why they should work.

Conceptualism has the merit of emphasizing that ideas are primarily devices of our thought, and means of thinking and ordering our experience (*Denkmittel*). But its psychology is very defective. To conceive ideas on the analogy of 'things' is utterly to misrepresent their psychic nature. And so long as the *meaning-process* is ignored, it matters little whether they are taken as psychological or as logical '*things*.'

None of these theories, therefore, which regard ideas as entities can really describe their psychological nature or understand their logical function.

§ 9. *What, then, are 'Concepts'?*

Concepts are not things. Judgments are not combinations of concepts,[1] nor do concepts exist outside of the Judgment. In fact they do not, properly speaking, exist at all. If logicians had taken the precaution of examining the psychological process of judging before constructing their theories, they could hardly have failed to observe that the characteristic features in our intelligence are not 'things' but *processes*. Perception is a process, thinking is a process, meaning is a process, attention is a process, and 'ideas' are—a misinterpretation of processes. Experience is hardly ever a passive receptiveness towards 'impressions'; it is nearly always a reaction upon the given. One of the most persistent and important of these reactions is the assumption, which we make almost continuously, that what we experience *means* something. This assumption is the taking up of an *attitude* towards our experience which is an addition

[1] Aristotle's *σύνθεσις νοημάτων*.

to the mere experiencing. It makes our experience a problem. We question it and ask *what* it means, and test the answers we obtain. This assumption of meaning is the logically important process which underlies the formation of 'concepts.'

In itself, however, it has no permanence. It is as fluid and changeful, as elusive and transitory, as anything in perception, and as radically incapable of being fixed. Meaning may be expressed and conveyed by words and by a variety of other signs (gestures, intonations, etc.), but it never resides in the words themselves, but only in the soul that uses them. Words are vehicles of meaning, but only when they are employed; *the* meaning of a word, as it is recorded in the dictionary, is only a possibility of using it (cf. Chap. I, § 3).

Nevertheless words are important. They are the channels for the conveying of meaning, and so give a definite form to the process. For when a word has been used repeatedly to convey a meaning, it becomes imbued with it. The sense becomes associated with the sound. The mere sound acquires the power to 'set us thinking,' *i.e.* framing tentative judgments and wondering what meaning it will have. Powerful associations of an emotional sort gather round the word, and seem to give it an intrinsic meaning 'independent' of its actual, transitory use. It becomes a radiating point which illumines and warms the adjacent regions of the soul. Moreover, by dint of stable usage such concretions of past meanings, condensed in words, lose much of their initial plasticity and vagueness, and become highly resistant to innovations. The traditional meaning of a word will always be defended, often passionately, against any extension which the growth of knowledge may seem to require. The word, therefore, may easily seem the ultimate centre of mental energy.

These are the facts which form a partial vindication of Nominalism, just as the fact that our thinking is applicable to reality and effective forms the truth in Realism. We may even say that if there were concepts,

Nominalism would be the true account of them, and they would be the meanings of words. But as the existence of the meaning-attitude is what generates the belief in concepts and demands the invention of words to express it, it is better to conclude that the whole Formal attempt to describe meanings as 'ideas' is mistaken, and that we must steadily conceive meaning as a process. When we realize this, we perceive that the right name for the theory of 'ideas' is the theory of Judgment.

CHAPTER VIII

THE FORMAL THEORIES OF JUDGMENT

§ 1. *The Formal Aspects of Judgment*

WE have steadily kept in view the fact that Judgment is the primary act of Thought and that the attempt of Formal Logic to 'analyse' it into something more elementary is a fictitious procedure which can be justified only by its convenience and success (cf. Chap. II, §§ 1-5). Whether the Formal account of a 'first part' of Logic prior to Judgment justifies itself on this score, may safely be left to the judgment of the reader. But there can be no doubt that in passing to the 'second part,' the doctrine of the *Judgment* (or *Proposition*), Formal Logic ought to be getting on to less factitious ground, and dealing with real processes of thought, of which it ought to be possible to give a formal account. Whether in point of fact Formal Logic ever wants to concern itself with actual judgment at all, and whether what it calls a judgment is ever more than an 'ambiguous' form of words for conveying various meanings, we shall gradually discover; but we cannot deny that it makes a show of giving a formal analysis of its so-called 'judgments.'

Accordingly we find that the multitudinous theories of Judgment are susceptible of classification in no less than four groups, according as they emphasize one or other of the formal aspects of Judgment. (1) Those who believe that Judgment is *not* the primary act of thought, but that (in some sense or other) Terms or Concepts may be regarded as something more elementary,

out of which judgments are built, are bound to regard Judgment as a mode of combining ideas or concepts, or of uniting subjects and predicates. And it is clear that of this procedure a general and formal account must be given. (2) Those who observe that all judgments lay claim to truth must regard this as a formal differentia of Judgment. (3) Those who consider how judgments differ from other products of mental activity are forced to define it formally by its capacity of being true-or-false. (4) Those who have meditated at all upon its function cannot fail to be struck by its universal claim to be about reality, and to reveal its nature.

All these four views apply to judgments irrespective of whether they are, in fact, true or false. Hence they do not affect the question of actual truth, and only concern the Formal nature of Judgment which has abstracted from the problem of *de facto* truth or falsity (cf. Chap. I, §§ 3-4).

§ 2. *Judgment as a Compound*

Of these four groups of views the first need not detain us. It has been a great favourite with Formal Logic ever since Aristotle defined Judgment as a 'synthesis of concepts as though they were one.'[1] But it has already been disposed of in our last chapter. If 'ideas,' as Logic understands them, are not psychic facts, if psychological 'ideas,' though they are psychic facts, are logically irrelevant (Chap. VII, § 7), and if the simplest act of thought is the assumption of a meaning-attitude and the existence of meaning is therefore the ultimate fact for Logic (Chap VII, § 9), it follows that nothing more elementary can be found out of which judgments may be composed. The complexities of structure analysed as subject, copula, and predicate, or as a combining of ideas, belong to the verbal expression of the Judgment, the Proposition, and do not penetrate to the unitary function of judging; so that once more Formal Logic has stopped short at words.

[1] *De Interpret.* chap. i.

§ 3. *Judgment as Truth-Claim*

This second way of defining the formal nature of Judgment is comparatively recent, but indisputably important. It is a remarkable fact about judgments as such that they all claim truth; so remarkable indeed as to reflect anything but credit upon a discipline which has failed either to notice it or to advance beyond it. For if its claim to truth is regarded as the essential characteristic of Judgment, it follows that all judgments must be taken literally at their face-value. On the *face* of it, every judgment *is* true because it *claims* truth. Judgments as such, then, must be proclaimed true and infallible. Whatever is asserted asserts truth, and no matter how assertions clash and vary, they must all pass as formally true, because none of them confesses to an intrinsic doubt of its own truth. It becomes, therefore, logically impossible to detect an error, a sarcasm, a lie, or a joke. From the standpoint of Formal Logic, errors, sarcasms, lies, and jokes become invisible, and cannot be known to exist. They are all happily included in Formal truth, and the difference between them and what the ordinary man calls true judgments must be regarded as extra-logical and irrelevant to Logic. This, no doubt, accentuates the paradoxical character of Formal Logic, and explains why this *ex officio* infallibility of every judgment has not been made as prominent as its sensational character deserved; but it is impossible to see how a consistent Formal Logic can either refuse to recognize truth-claims or go behind them. It is true, no doubt, that to confine itself to the recognition of formal truth-claims has the practical drawback of rendering Formal Logic utterly inapplicable to the conduct of thought. But can this practical objection be allowed to impugn the validity of logical theory, and to force upon it a renunciation of its fundamental assumptions? Why should the science of Formal Logic trouble about the problems of actual thinking, or pander to the demand for a practical distinction between truth and error?

§ 4. *Judgment as True-or-False*

No really stalwart logician would capitulate before such objections. But even he might be distressed by discovering urgent reasons for defining Judgment in a different way, which is quite incompatible with the above. For if Judgment has been defined as inherently *true* in virtue of its form, how can it *also* be defined as inherently *true-or-false*? For this definition expressly bases itself on the distinction between truth and falsity, while the first has ruled out the consideration of falsity as extra-logical. Moreover, the conception of Judgment as that which is true-or-false is of great antiquity and authority. Aristotle[1] first enunciated it, and all logicians have followed him.

They could hardly do otherwise, for it is indispensable to the constitution of a Formal science of Logic. It is needed to mark off the sphere of Logic from that of Psychology. Without it how could judgments be distinguished within Logic from concepts, and from such extra-logical processes as questions, wishes, and commands? And even if we venture to reply that Aristotle was wrong in thinking that concepts could have meaning *per se*,[2] it is yet vital to Formal Logic to make the capacity for being true-or-false the criterion of the logical. For unless questions, wishes, commands, and postulates are rigidly excluded from the sphere of Logic, our whole science is plunged into the abyss of psychology.

In actual thinking all these 'extra-logical' processes are intimately interwoven with our judgments, and essential to the continuance of mental life. Every judgment originates in the matrix of some mind. It is, explicitly

[1] *De Interpret.* chap. i.

[2] *Loc. cit.* he declares that 'goat-stag' *means something*, even though it is not yet true-or-false. But what he is evidently thinking of is only the 'meaning of the word.' So soon as the word is pronounced, it is a psychical fact that it becomes a cue for questionings, and attempted judgments crowd in upon the mind. *E.g.* 'Goat-stag! What is that, I wonder? Is it a mythical monster, or an antelope, or a nonsense-word?' None of these suggestions need be affirmed in the end, but they suffice to give a very definite feeling that the word 'means something.' (Cf. Chap. VII, § 9.)

or implicitly, an answer to a question. If, that is, it has not been consciously intended as an answer, it may always be called in question. It must be prompted by some interest,[1] and may be prompted by a wish. Consciously or unconsciously, it is the product of a *selection* from among alternatives which existed for its maker or for others, and so to some extent 'arbitrary' or volitional. Every principle similarly is in the end a postulate, *i.e.* a demand, and not a 'law' descriptive of the course of nature (cf. Chap. XVIII, § 5). Without principles (postulates), hypotheses (questions), ideals (purposes), and interests (motives), no science can arise or prosper. In short, the nature and course of thinking cannot be understood without taking into account this 'psychological' side of judgment.

But does Logic want to take all this into account, and if it did, could it remain Formal? Would it not have to concern itself with real truth and error, instead of with the formal distinction which a child can make? Would it not have to enter into all the psychological ramifications and subtleties of actual human minds? And how are order and clarity to be evolved out of this chaos?

Formal Logic has always assumed this to be impracticable. And in spite of the difficulty of combining its definition of Judgment as something which must be true, and its definition of it as something which must be true-or-false, with the respect it professes for the 'law' of Contradiction, Logic may well shrink from the adventure, and prefer to remain entangled in a fundamental contradiction. For it is always possible to conceal its condition. The two inconsistent definitions need not be put in juxtaposition, nor made too plain. This policy has been singularly successful in the past, and will most likely last a long time yet. And the embarrassment of Formal Logic is really such that much may be forgiven

[1] What that interest is, and whether it is popularly called 'theoretic' or 'practical,' is, of course, psychologically quite irrelevant. It makes as little difference whether a boy studies geometry because he likes it, or because he desires to win a prize, or is afraid of punishment, as whether he plays cricket for these reasons.

it. We may leave, then, the true-or-false as the criterion of Judgment with the remark that, even if Formal Logic could make good its claim to it, it would yet fail to distinguish Judgment formally from Perception (cf. Chap. I, § 6).

§ 5. *Judgment as Reference to Reality*

That Judgment is essentially referred to reality, that it claims to be 'about' reality, that thoughts are valued (ultimately) for the purpose of handling 'things,' is certainly an important formal feature about thinking. The only question about it is whether it is not *too* formal to be valuable. As Formal Logic conceives it, it is impossible to see how it can serve the purpose of discriminating between good thinking and bad, between reality and unreality. For the formal sense of 'reality' is so vague and general as to be useless for an analysis of actual thinking, and for a critical appreciation of its value. It tells us that every judgment refers to reality in the widest sense. But this is to tell us nothing we did not know before. For if the matter judged about had not been somehow and in some sense an object of thought, how could a judgment have been made about it? Moreover, this was not what we desired to know. We did not desire to know that reality in general was in some vague and remote way referred to in the judgment; we wanted to know what precisely was the sort of reality it was about, and whether it reached the precise reality it aimed at. For we were perfectly aware, long before Formal Logic tried to confuse our minds on the plea of enlightening them, that realities are of many sorts, and that it matters a great deal that we should discriminate between them, and not be beguiled into taking one sort for another. We may even have been aware that various sorts of 'unreality' are technically included by Logic in the 'reality' it talks about, though we should search its deliverances in vain for any confession of the fact.

At any rate the ordinary man, though he uses terms loosely enough, succeeds in discriminating the different

orders of reality with considerable precision. He knows that a fancy, an ideal, a dream, a pain, a stone, a man, a law, an atom, a lie, a circle, and a god may all be called real in some sense without on that account putting them all on the same level. He recognizes that they are all formally capable of becoming objects of thought, and that judgments about them may be true or false. He understands that, *e.g.*, 'I have a toothache' may be true, or again false, according as one person says it or another, at one time or another. He can discriminate between the true and the false in the judgments that 'Egyptian gods, centaurs, and minotaurs all had animal heads,' or that 'Rebecca in *Ivanhoe* really loved the Templar and married him,' without becoming a convert to Egyptian theology and Greek mythology or taking Scott's novel for authentic history. Lastly, he may even perceive that in some cases it depends on the sort of reality intended whether a judgment is true or false, and that conflicting judgments may both be true if they have different references. *E.g.* 'A goat-stag is a mythical animal' and 'a goat-stag is an antelope' can both be true, if the reference in the one case is to Aristotle and in the other to the modern zoological genus *Tragelaphus*.

What gain, then, is it to have Formal Logic telling us that Judgment is always about reality? How does it help us to detect the real reference and actual meaning of an assertion? Is it enough to know, quite generally, that a reference to reality is *intended*? Do we not want to know *which* sort of 'reality' was intended and whether the judgment's intention is actually achieved, whether the particular sort of reality referred to is actually possessed? If we have failed, is it a consolation to be told, 'Well, you may not have succeeded in judging about the reality you meant, but still the lie or inconsequence which baffled you was, after all, a sort of reality about a sort of reality, and not blank nothingness!'? Which, to put it mildly, seems a mockery.

Formal Logic sometimes seems to be dimly aware that it does not afford much practical guidance to our

thinking, but is sadly prone to useless platitude. But its favourite escape from such criticism is a dive into metaphysics to conceal its logical fiasco. So here. The harmless and almost meaningless doctrine of the formal objectivity of the Judgment is transformed into a metaphysical revelation. We are assured that the reference to reality in Judgment is not the formal thing it seems. It means that the universe is one system, and all the parts thereof are so indissolubly connected, that whatever is affirmed about any part must inevitably in the end qualify the whole. Thus, whether its maker knows it or not, whether he is right or wrong, whether he speaks the truth or tells a lie, every judgment any mind can formulate unceasingly attests the glorious truth that the universe is one.

Truly an inspiring revelation! It is astonishing that it does not carry conviction as well as consolation universally even to philosophers, and that metaphysicians can still regard it as a question whether and in what sense the sum of experiences can be united in a single system. Presumably, therefore, there is something wrong about the argument. A strict logician, at all events, will think so. He will point out that in an ordinary judgment no one is raising the question whether the 'parts' of the universe (if there really is a universe) are (by definition) included in it, but that the real question is whether we are succeeding in disentangling the part of 'the universe' which concerns us from other parts we did not intend. He will suggest also that the formal reference to reality which every object of thought as such implies is as far from attesting any ultimate reality as the formal truth-claim is from guaranteeing the truth of every judgment, and insist that it is common to the 'real' and the 'unreal,' and that the object of inquiry is always *what sort of reality* our objects have. To infer from this scientifically and practically unimportant form that the form of Judgment depends on a metaphysical relation to ultimate reality, he will regard as simply one more example of the irrelevant confusion of logic and metaphysics to

which Formal Logic has recourse so often. He will deny, therefore, that the logical reference to reality pledges him to any metaphysical opinion, and that a monistic metaphysic can be established by the analysis of any mere form of the Judgment.

It would indeed be strange if our real meaning in judging should be nothing we either consciously aim at or attain, but something we cannot even aim at without self-contradiction. The obvious objections to the doctrine that to aim at metaphysical reality as a whole is the true meaning of judgment are (1) that psychologically it is false, (2) that logically it is destructive of the meaning of judgment, and (3) that it is inherently self-contradictory.

(1) If I say, 'You have taken my hat instead of yours,' I certainly do not *mean* to affirm about reality at large. I have no intention of enunciating an eternal truth about the totality of reality. But I have a very definite intention of making an assertion about that *part* of reality which happens to concern me, and I believe my judgment to be about *that*. I am trying to make a distinction in it between 'my' hat and 'yours.' If I am forbidden to select this *part*, the meaning of my judgment disappears. Whatever 'the' meaning of the judgment may now be said to be, it is no longer *my* meaning, and I must repudiate all responsibility for it. It has become impossible for a part of the world, and therefore for *me*, to judge about parts of the world, and judgments may no longer be selections. Now this is certainly not the state of affairs which my judgment either presupposed, asserted, or aimed at. If I had realized that this was what I was attempting, I should not have troubled to make the judgment, but should have recognized the utter futility and inevitable failure of all human judging. An interpretation of judgment which contains such implications is hardly attractive to any but a sceptic; it is certainly a false description of the psychical state of the judger's mind, and psychologically indefensible.

(2) It is also logically impossible, because it lays down conditions of the possibility of judgment which are

logically unrealizable and destroy the meaning of judgment. If the real aim of every judgment is not to judge about a selected part of reality and to convey the meaning which its actual maker consciously has, but to express a truth about reality as a whole, it is clear that no judgment can be true until it does express the whole truth about the whole of reality. But certainly no such judgment is known to man. It is not only unrealized, but humanly unrealizable. Omniscience would be required to make a true judgment. But omniscience would not make it, because it could have no motive to make it; for it would add nothing to its knowledge. It would also have to be formally a tautology, because it would only affirm the whole of reality of the whole of reality. Omniscience, therefore, would not *judge*, but would have all knowledge ever-present to it, and would presumably be bored ineffably. The function of judging, therefore, essentially requires the selection of *parts* of reality as subject-matters for judgments which are *partial*, in the sense of treating the *rest* of reality as irrelevant, and can be true, *because* they are thus partial. To proclaim the whole of reality, therefore, as the aim of every judgment, is not only to render all human judging futile and all human judgments false, but also to represent Judgment itself as inherently unmeaning.

(3) If, nevertheless, we persisted in this doctrine, we should only end by contradicting ourselves. For if Judgment could affirm the whole of reality, it would have to include *also* the meanings actually intended by human knowers. For these meanings were indisputably matters of psychical fact that occurred *within* the whole of reality. But they are also the very things the theory began by setting aside. It was denied that they were the meaning of the judgment. But it now turns out that the true meaning of the judgment compels us to reassert that they *were* its true meaning. Hence these psychological meanings are alternately denied and reasserted. If it be replied that they are reasserted only as *parts* of the truth, it is only necessary to point out that in

the first place this does not diminish the contradiction, since what was asserted (by the actual judgers) and denied (by the metaphysicians) was the right to entertain partial meanings made by selections, and these meanings have now to be conceded and provided for; and in the second, that, *though they must somehow be included as they were meant, they cannot be included as they were meant.* For they were meant to be true of *parts* to the exclusion or neglect of the whole; and they have to be included, *in their full refractoriness*, by a theory of which it is part that the truth admits of no parts, and that whatever is partial is *ipso facto* false.

Our verdict, then, must be that if the formal reference to reality in the Judgment is interpreted metaphysically, it is a downright blunder and a prolific parent of absurdities; if it is understood logically, it is inadequate and misleading; while if it is understood in a common-sense way as meaning 'reality' in the physical world, it is emphatically *false.*

Altogether we are driven to the conclusion that the Formal treatment of Judgment is quite unprofitable. It can neither extricate itself from contradiction nor assist our actual thinking. Nor is this marvellous. For the real nature of Judgment cannot be grasped without examining the meaning-attitude in its concrete connexions with the psychic processes which determine the course of judgments. But it is just this inquiry which Formal Logic has declared to lie beyond its purview.

CHAPTER IX

THE IMPORT OF PROPOSITIONS

§ 1. *The Proposition as Verbal*

FORMAL Logic does much better when it considers the verbal forms in which judgments may be expressed. For words are its most congenial hunting-ground. Consequently its 'analysis' of the 'Proposition' is brilliant and almost instructive. Once the terrible entanglement of the actual judgment in a context has been put aside, and the inquiry has been safely restricted to a simple form of words, it is easy to classify exhaustively 'the meaning' of its 'terms.' Not that no difficulties present themselves, but they are mostly of a trivial and soluble sort.

§ 2. *The Formal Analysis of the Proposition*

Formally, we have seen (Chap. I, § 5), the ideal Proposition is analysable into a *Subject* about which the assertion is made, and a *Predicate* which is asserted (or denied) about the Subject, and a *Copula* which is the mark of the predication and (by convention) some mode of 'being,' *i.e.* 'is' or 'are.' Actual propositions, however, do not fully conform to this logical model.

(*a*) The whole meaning may sometimes be conveyed in a single word. The cries 'Fire!' or 'Wolf!' may warn even a logician as effectively, and more succinctly, than the propositions 'There is a fire,' or 'A wolf is coming,' or even 'Some wolf is a member of the class of things that are now approaching.'

It may be contended indeed that Formal Logic is not entitled to take note of facts which imply such a knowledge of human psychology, and should maintain rather that the terms 'fire' and 'wolf' *per se* are not propositions; but, after all, the facts are very obvious, and Formal Logic may be allowed to make the most of a rare chance of distinguishing itself from verbalism.

(*b*) *Impersonals* occur, which specify no Subject. When 'it rains,' what is 'it'? Again, it may be said, language falls short of the exquisite precision of the logical expression.

(*c*) It may happen that the verbal is not the real Subject. 'Nobody is in the room' is an assertion about the room and not about 'nobody.' The use of ordinary intelligence is to a certain extent permissible in Formal Logic. Or at any rate it knows the meaning of familiar idioms, even though it will not understand any unusual use of a phrase.

(*d*) That 'The bowsprit gets mixed with the rudder sometimes' in the Proposition as in *The Hunting of the Snark*, Formal Logic fully knows. *I.e.* it may sometimes be hard to determine which is the Subject and which is the Predicate of a proposition, though such stock examples as 'Great is Diana of the Ephesians!' would hardly lead one to think so. The really hard cases, however, cannot be mentioned, because they cannot be detected without knowledge of the context.

(*e*) The Copula is often lurking in the verb, and has to be extracted. Formal Logic, therefore, triumphantly analyses 'he philosophizes' into 'he is philosophizing,' and contemptuously ignores objections to its lack of linguistic elegance, and even to its abolition of recognized differences of meaning, as, *e.g.*, between 'he *plays* cricket' and 'he *is playing* cricket.'

(*f*) The restriction of the Copula to the present tense of the verb 'to be' is more contentious. When 'Queen Anne died in 1714' is 'logically' interpreted as 'Queen Anne's death is an event of the year 1714,' or 'The date of Queen Anne's death is 1714,' it may fairly be objected

that the shifting of the emphasis from 'Queen Anne' to the date amounts to a change of meaning, and that the verbal elimination of the reference to the past is illusory in all cases, and perverse wherever the relation to the time order was just the point intended. Little seems to be gained, even Formally, by transforming 'The priest of Diana Nemorensis was a run-away slave' into 'The priest of Diana Nemorensis is a person who was a run-away slave,' and it is hard to convince common-sense that the meaning of 'You will die' is adequately rendered by 'Your death is a future event.' The Formal analysis here does not seem willing to preserve the true meaning.

§ 3. *The Interpretation of Propositions*

We have seen in Chap. III, § 1, that each of the terms in a proposition may be interpreted in extension or intension, and that there consequently result four possibilities of meaning. (1) Both subject and predicate may be construed in extension ('denotation') by what is called the *class theory* of predication. (2) The subject may be taken in extension, the predicate in intension ('connotation'), so that the aim of the proposition is to assert an attribute of a subject. This is called the *predicative* view. (3) Both subject and predicate are taken in intension, = the '*attributive*' view. (4) The subject is taken in intension, the predicate in extension.

There can be no doubt that these alternatives are formally *exhaustive*, nor that the meanings they affirm are on occasions *actually intended*, though for reasons given in Chap. III, § 1, it is psychologically so unnatural to formulate one's meaning in the fourth form that this type is necessarily rare. Still it cannot be denied that a man *may* mean by 'man is mortal' 'the attributes of *humanity* indicate an object belonging to the class *mortal*,' even as he may mean by it 'the class *man* is included in the class *mortal*,' or '*men* have the attribute of *mortality*,' or 'the attribute of *mortality* is implied in the attributes of *humanity*.'

Criticism of the Formal treatment of the Import of Propositions, therefore, must proceed on other lines. It may be pointed out that if this classification is really exhaustive, Formal Logic should have nothing more to say. For the only question which remains is *which* of these four possible meanings is the one *actually intended* in each judgment. And this is by no means an easy question to answer. For (*a*) the assertor is very often far from clear on the subject himself to start with, and may depart from the original meaning of his formula as the discussion proceeds. (*b*) A proposition may not mean what it seems to say. Sarcasms and jokes, *e.g.*, often mean the very opposite of what the words mean; and only a reference to the actual context will determine whether a meaning is to be taken literally or not. (*c*) An assertor's meaning may be really indeterminate, and he may be willing to accept several interpretations of it, and decline to choose between them. Or he may say, 'All these aspects of my proposition I accept; they are all true, though this one was most prominent in my mind when I asserted it.' And as this might be the truth, as in fact it does not follow from the exhaustiveness of these interpretations that they are also *exclusive*, it would be hard to say how Formal Logic could object to him. Fortunately, it has not got to. It can declare the whole question of what the proposition actually meant to be psychological and extra-logical. This may be baffling to our appetite for instruction, but is at any rate consistent with the Formal attitude.

It is more difficult to rebut the charge of inconsistency when Formal Logic essays to evaluate these interpretations, and to declare that some of them are *better* than others. For if all are *possible* meanings, none of them can be the *only* meaning, or the *right* meaning, while to discuss which is the *commonest* or most *natural* meaning is to venture on psychological assertions. It is only, therefore, by means of the covert introduction of an extraneous purpose, such as the putting of propositions to some scientific use, that the 'attributive' or

the 'predicative' interpretation can be preferred to the 'class theory.'[1] But this is to transcend the bounds of Formal Logic.

§ 4. *Universes of Diction*

The question 'whether the Copula asserts existence' is sometimes discussed as if it were a deep metaphysical problem. But if we will make up our minds to define what we mean by 'existence,' it may even appear quite a simple matter. The question really is whether the *is* of predication commits us to an assertion about the 'real world' of ordinary life. If (*a*) by 'existence' we mean existence in that world, it is clear that the Copula does not necessarily assert this; if (*b*) we mean existence in some other sphere of reality, it is not improbable, and may even be formally necessary, that it should 'assert existence.'

Now as regards (*a*) it is undeniable that we can frame propositions, true and false, about objects which do not belong to the 'real world.' We can discuss, *e.g.* whether Sirens had or had not human heads, or whether the wings of devils most resembled those of bats, birds, or beetles. This would seem to show that the Copula is a mere mark of predication, and that the 'being' it asserts is that proper to the sort of 'existence' the proposition refers to. If (*b*) we construe 'existence' as referring to any sphere of reality and as not necessarily restricted to the 'real world,' we get the same result. In either case

[1] It is in point of fact quite false, though it is often so argued, that any one interpretation possess scientific value exclusively. For scientific purposes we need not only to attribute qualities to subjects and to connect attributes together, but also to classify our subjects. And such classifications often react on the connotation of the objects classified, and lead to important discoveries. For example, a scientific philatelist may undertake to arrange a number of stamps of the same 'kind' according to their colour-shades, and thereby discover that the collection in question is really composed of a number of distinct issues, and that the 'kind' ought to be split up into a number of varieties (or even of 'kinds'), some of which are unofficial ('forgeries'). It is doubtless true that the extension of a term cannot wholly abstract from its intension, and that the objects in a 'class' would not be in that class unless they appeared to qualify for it by possessing certain attributes. But it is similarly true that in considering its intension its extension cannot be wholly ignored. Science is not a fanciful connecting of attributes which nothing ever exemplifies.

we have to understand the sort of 'reality' the proposition refers to and intends in order to understand what it really asserts, and unless we take this precaution there is a serious risk that the parties to every discussion will be talking about different things (Chap. VIII, § 5).

The technical way Formal Logic has of making this very necessary distinction is to say that the Copula asserts existence within a *universe of diction* or *suppositio*. Thus the truth or falsity of propositions about Sirens and Centaurs belongs to the realm of Greek mythology; of propositions about Rebecca and the Templar depends on the text of *Ivanhoe*; of propositions about unicorns and red lions on the conventions of heraldry and sign-painting; of propositions about atoms and electrons on the speculations of physics. All these propositions have an intelligible sense in their proper universe, however mad they would sound otherwise. Even "the transactions were mere scalping deals for quick turns, the leading bulls holding conservative views pending further crop developments," becomes rational when it is traced to its proper universe in the Stock Exchange column of a newspaper. It is evident, moreover, that there is an indefinite plurality of such universes of diction. Every science, every business, and every work of fiction will constitute a universe of its own, and every sentient being has at least one[1] private universe of his own personal and incommunicable experiences (pleasures, pains, etc.).

Agreement, therefore, on the *suppositio* is essential to understanding, and is by no means easy. In default of it discussion is at cross purposes, and comes to nothing. Here again Formal Logic ought to stop, having led to nothing that is soul-distending.

Accordingly, if we are not satisfied with ascertaining what in point of fact is the logical meaning of the proposition *in situ* in its universe of diction, and are dissatisfied with the disorderly plurality of universes logic seems to leave on our hands, there is a temptation to raise other questions. We can ask whether

[1] More, if he dreams or suffers from multiple personality.

these universes, however autonomous they seem to logic, are not in reality all related, and inquire into the metaphysical nature of their relations. We can then discover that in point of fact the common-sense world of bodily reality does form a sort of ultimate standard of reality, to which the different sorts and degrees of reality or 'unreality' (which also is a sort of reality) ascribed to dreams, mathematics, fictions, philosophies, religions, private experiences, hallucinations, etc., are referred, and that thereby their 'real' reality is tested. Thus the primary plurality of universes may (in theory) be reduced; we go on the principle that the less important and valuable are attached and subordinated to the more, even though they are not ever completely unified in practice.

This procedure is interesting, but it is not logic. It has nothing to do with the problem of ascertaining what a proposition means, nor does it affect the doctrine that the 'being' predicated by the Copula is that of the *suppositio*, and that until this has been ascertained, no further use can be made of the proposition either by metaphysics or by anything else. The logical form of the proposition, therefore, yields us no answer to the question whether and to what extent reality can be unified. The migration from Logic to metaphysics is itself an example of neglect to ascertain a universe of diction.

CHAPTER X

THE LAWS OF THOUGHT

§ 1. *The Statement of the Laws*

It is high time that the fundamental Laws of Thought should now be taken into consideration. For the inter-relations of the propositions used in thinking manifestly appeal to these Laws, though they are often so defined as to apply also to terms taken in abstraction. It is astonishing, however, that more is not made of them in Formal Logic. One might have expected them to be put in the very forefront of the science, and to be fully discussed. Instead of which there is a growing practice in modern Logics not to discuss them at all, but to relegate them to footnotes, and subsequently to clinch arguments by appealing to an interpretation of them which has not been established. The reason for this curious treatment is doubtless that their difficulties have driven them underground. And well they might. For in them all the self-contradictions and confusions of the logical standpoint reach their acme. We, however, cannot conscientiously shirk an inquiry which goes straight to the roots of Formal Logic.

It will be well to start by enumerating these Laws as ordinarily stated.

(1) The Law of Identity affirms that *A is A* or that *every judgment* (? proposition) *is identical with itself.*

(2) The Law of Contradiction (? Non-Contradiction) affirms that *A is not not-A* or that *A cannot both be A and not be A.*

(3) The Law of Excluded Middle affirms that

everything must be either A or not-A, or that it *must either be A or not be A*.

It should be noted that the double formulation is necessitated by the doubt whether these 'laws' apply to *things* (terms, concepts, etc.) or only to *propositions*. Still the formulas look self-evident and innocent enough at first sight. Nevertheless a volume might be written about each of them. Their essential trickiness consists in the fact that every mind is expected to admit their *truth*, without inquiring into their *meaning*, which is in fact the prior question. But how can any one deny the truth of that of which he feels he does not understand the meaning? His natural reverence for mystery forbids him. But if the question had been raised what (if anything) these possibly indisputable, but certainly unscrutinized, 'truths' really meant, it might have appeared that the question as to their truth did not admit of a simple answer, because they were (in different senses) both true and false and meaningless.

When therefore we inquire seriously what they mean, we soon begin to feel that, so far from their being self-evident platitudes, there is a doubt rather whether they are not either fantastically impossible or totally devoid of meaning. For a number of difficult questions arise both about the 'Laws' in general and about the meaning of each of them in particular, and it is found that logicians are very far from being in agreement about them, either with each other or with themselves. To select a few of the more urgent questions—in what sense are these formulas *Laws*? Are they laws of *thought* or of *things*, or of both, and if so, of which primarily? In what sense and to what extent are they consistent with the principles of Formal Logic? In what sense and to what extent is there truth in their general idea? What precisely is the meaning claimed by each of them, and to what objections is it open? How far and in what sense are they severally true?

§ 2. *In what sense are they Laws?*

We may begin by discussing this question, because it is fundamental and seems fairly straightforward. The alternatives seem to be two. The 'Laws of Thought' may be either *laws* in the natural science sense, *i.e.* uniformities actually observed to obtain in the working of our minds, or *canons* of right thinking.

If we take them as natural laws they must be exemplified in *all* thinking. It is difficult to see, therefore, how any one can fail to observe them, or can be accused of doing so. It should be as impossible, *e.g.*, to contradict oneself as to fail to gravitate. How, then, can self-contradiction be the name for a possible offence in the catalogue of logical crimes?

The most that could be proved in an alleged case of 'self-contradiction' would seem to be that assertions have been made which seem *verbally* contradictory, and the most that should follow would be that their author should be invited (courteously) to explain them. He has then a choice between several alternatives. (1) He may explain that the 'contradiction' is only in *words*, and that what he *meant* to express is *not* contradictory. (2) He may say that he has changed his opinions and no longer holds one or the other of the conflicting views. (3) In the worst event he may even admit that owing to a lapse of memory, or lack of thought, or intentness on a momentary purpose, or excitement and emotional pressure, or some such psychological influence, he had failed to consider the two propositions in their connexion. But now that he is called upon to do so, he sees, of course, that he does not believe them both and must withdraw at least one of them. He must reconsider his position, or rather *take up a position*. For he has not yet really got one, since the position he was believed to have is 'contradictory' and untenable. As his meanings conflict, and cancel each other, he has not really meant anything, and must make a fresh start, which he humbly begs to be allowed to do.

All this, however, would hardly pacify a Formal logician. It is to explain the 'contradiction' *psychologically*, and not to explain how contradictions are 'logically' possible. He will insist, therefore, that the meanings of the two propositions remain, whether any one asserts them or not, and are in flat contradiction, and that therefore a logical crime remains to be somehow expiated. Unfortunately he does not explain how a contradiction, if 'real,' can, on his own showing, be more than *verbal*.

It is tempting, therefore, to take the 'Laws of Thought' as *Canons*. They do not state how men think nor condescend to inquire into the infinite confusions of human psychology. They enact ideals and declare how men *ought* to think, and when they are known men can (imperfectly, no doubt) *regulate* their thinking by them.

It is far from clear, however, that the 'laws' can occupy the lofty ground thus assigned to them. (1) It is not made clear on what rests the obligation to think in accordance with these canons. Why should they be adopted as 'ideals,' seeing that they are not conformable to our practice? Should we not be told what advantages accrue to us by observing them, or what penalties we incur by not observing them? (2) Must they not, like all thinking, be brought into some connexion with human life? Else why think at all, or trouble about ideals of thought? (3) How is it that we can think without knowing them, or at least without knowing what the logician means by them? Why, moreover, is it that an ordinarily intelligent man can conduct his thinking pretty nearly as successfully as a logician? (4) Is it not still left unexplained why these canons are not, in fact, always observed?

Neither view, then, seems satisfactory. The 'Laws of Thought' are not merely uniformities, but carry obligation. And 'ought' implies 'need not.' Nor are they merely obligations; for no one willingly defies them. Why not? Why should no one wish to do what admittedly he can do? For their obligation no intelligible ground has appeared. They seem then to be neither 'Laws' nor

'Canons.' Possibly, however, there is a third alternative, which accounts for their anomalous position, but has not been grasped by Formal Logic.

§ 3. *Aristotle's Account of these Principles*

Perhaps we shall best advance our insight into these perplexities by considering the first systematic account of these principles, that of Aristotle.[1] Aristotle explicitly recognizes the laws of Contradiction and Excluded Middle, and implicitly that of Identity. But he does not treat them as *logical* principles. He regards them as the chief examples[2] of the absolutely axiomatic principles from which all demonstrations must start. They are therefore 'common axioms' which underlie all the sciences. They belong accordingly to metaphysics, and are fully discussed in *Metaphysics* Γ, chaps. iii-viii. This explains why they figure primarily as revelations concerning the nature of things, though they are also treated as principles of thought. Aristotle indeed tries alternately to show that as principles of being they must become principles of thinking[3] and that as principles of thinking they must be also principles of being.[4] His formulations accordingly vary; *e.g.* he declares that it is (1) *impossible at the same time to be and not to be*,[5] or (2) for *contraries to inhere at the same time in the same thing*,[6] or (3) that *the same thing in the same respect should have the same inhere in it and not*,[7] or (4) *at the same time to affirm and deny truly*.[4] The Law of Excluded Middle is formulated at the beginning of chap. vii as an *impossibility that there should be anything intermediate between contradictories* and a necessity that *of each subject each predicate must be*

[1] Plato enunciates the Law of Contradiction, but cannot be said to give a critical account of it.

[2] They are indeed his *only* examples of such principles. For the 'common' principles of mathematics, which he also sometimes adduces, are not strictly common. They have not, he thinks, quite the same significance in the several sciences; the axiom of equality, *e.g.*, does not mean quite the same in arithmetic and in geometry, but is coloured in each case by the specific nature of the science.

[3] *Met.* 1005 b 22. [4] *L.c.* 1011 b 20. [5] *L.c.* 1006 a 3.
[6] *L.c.* 1005 b 26. [7] *L.c.* 1005 b 19.

affirmed or denied. It is thus taken as a law of thought, and Aristotle sees no incongruity in coupling it with the law of Contradiction conceived as a law of things, and succinctly enunciating them as '*it is necessary that everything should be either affirmed or denied* and *impossible at the same time to be and not to be.*'[1]

The 'Law of Identity' is implicitly appealed to in the refutation of the critics of the law of Contradiction (chap. iv). It takes the form of the assumption that the *word* 'be' or 'not be' has a meaning, that not to have *one* meaning is to have *no* meaning, and that every 'name' (*word*) has *one* meaning.[2]

Lastly, Aristotle is aware[3] that in order to meet logical objections the law of Contradiction must be equipped with a number of qualifying clauses, 'at the same time,' 'in the same subject,' 'in the same respect.'[4]

But he does not seem ever to have seen how far such qualification might have to go, nor to have grasped that he was admitting a principle in virtue of which *any* argument from one case to another might be challenged, and therefore fatal to his Formal conception of 'contradiction.' Once the contentions are withdrawn that A is absolutely and eternally and without reservation A, and that if a thing has once been called A it must for ever remain A and cannot change in any respect,[5] a critic of the Laws of Thought has merely to insist that the two cases of A are not identical in *all* respects and to assert that their differences are *relevant* to the point at issue. The Laws of Thought are thereby put completely out of action, and he can, unhindered by them, assert one thing

[1] *L.c.* 996 b 29.

[2] *L.c.* 1006 a 31, 1006 b 9, 1006 b 13. These are more clearly appeals to the principle than the *obiter dictum* in *Anal. Prior.* I, 32, 47 a 8, that 'all truth must be entirely consistent with itself,' which it is usual to refer to.

[3] As was Plato before him. *Rep.* 436 B.

[4] He entirely forgets these, however, when (chap. v) he is arguing against the Protagoreans whom he conceives to deny the law. No doubt it follows from the doctrine that 'what appears to each is true *to him*,' that contradictory beliefs are true 'at the same time'; but it is not, therefore, asserted that they are true *to the same persons* or *in the same respect*, and the Protagorean dictum merely requires us to add these further qualifications before we cry out against a 'contradiction.'

[5] Which is the sense modern Formalists try to give to the 'Law of Identity' (cf. Chap. XXIV, § 5).

in the one case and another thing in the other, merely telling his opponent that he has erroneously taken them to be 'the same.' For it is arbitrary to admit that we cannot argue from 'A to-day' to 'A to-morrow' and yet to deny the general principle implied in this, viz. that the inference from 'A in one context' to 'A in another,' or from 'A to me' to 'A to you,' is similarly precarious. Nor is the critic in so doing denying the law of Contradiction in the abstract; he is, as Mr. Alfred Sidgwick has so admirably shown (*e.g. The Application of Logic*, pp. 109-111), really raising the question of the *relevance* of the differences between the two cases to the point at issue. Now no merely formal appeal to the 'law of thought' in the abstract can settle this question of fact, for any dispute about what is relevant implies a knowledge of the particular circumstances of the 'cases.'

Aristotle's attempt to dispense with this 'material' knowledge by appealing to the meaning of the *word* would seem almost childish, if it were not so clearly the only thing a Formal logician could say. We have seen that it is a mistake to regard meanings as independent of judgments (Chaps. VIII, § 4, VII, § 9), and as absolutely rigid (Chap. VII, § 8). Besides, it ignores the fact that the question really raised is whether the same 'name' is properly applicable to the two 'cases,' and whether we are right in taking them as both 'cases' under the 'law.' Aristotle's whole argument from this point of view becomes a dogmatic begging of the question, which leaves it quite doubtful how (if at all) the principles of Identity, Contradiction, and Excluded Middle are to be applied.

§ 4. *Are they Principles of Thought or of Things?*

Nevertheless we have made some progress. We have seen that we must make up our minds whether to regard them as principles of thinking or of being. The former view seems easier, and prevails even over Aristotle's objectivist bias.

In either case there are further problems. If they are principles of thinking, we have to consider how they may be applied to reality and with what success. If they are principles of being, we want exhaustive evidence that all reality obeys these laws, and must at least grapple with the paradox of Change. For the reality of Change seems flatly to defy them all. A thing that changes neither remains itself, nor is it incapable of assuming contrary attributes in time or even simultaneously. It both is and is not, and cannot strictly be said to 'be' either one thing or another. If the moving arrow ever 'were' at the points it passes through, if we were ever right in *saying* that it was, Zeno's inference would be inevitable that motion is impossible, and philosophy would part company with common-sense for good and all.

This discrepancy between the principles of thought and the behaviour of things seems an insuperable objection to regarding them as principles of being. But we do not wholly escape from the problem by conceiving them as principles of thought. For we then have to explain how it is that though reality is not as we think it, it yet behaves as if it were, to such an extent that it is worth while thinking about it. How is it that though things do not remain 'identical' nor free from 'contradiction,' they are yet universally *taken* to be so? And why do these assumptions of our thought, though they are literally false,[1] yet practically serve our purposes? In order to answer these questions it will be necessary to inquire more precisely what our principles severally mean.

§ 5. *The Meaning of Identity*

We have seen in § 1 that Formal Logic treats the Law of Identity as so self-evident a principle as hardly to think it necessary to inquire into its meaning. It never discovers in consequence that when criticism has disposed of interpretations which are manifestly impossible or un-

[1] If it is the function of 'truth' to copy 'reality.'

meaning, nothing is left of it but a *definition* of 'identity,' couched in obscure and inadequate terms.

Its attitude is naïve and charming. How can any one question that A is A? For what else should it be? It must be A, for it must be something, and can only be what it is! Surely you will not deny that something is and that it is something?

If it were worth while, it would be easy to show that this either denies the possibility of change or means nothing. But as Formal Logic would disclaim the Eleatic audacity of the first, the second alternative alone seems open.

This interpretation is supported also by the fact that unless *A is A* means that *A is B*, the 'law of Identity' renders thought impossible, which seems a curious position for a 'law of thought' to get into. For, strictly interpreted, it would be impossible to predicate anything but A of A, and some philosophers have observed this ever since the days of Antisthenes. If A's identity means that it excludes every not-A, it excludes all the world from itself, and nothing but A can truly be predicated of it. All valid judgments must become tautologies. But to utter tautologies is not to think, nor are actual judgments tautologies, nor are they couched in the form *A is A*. They employ the form *A is B*, and even when they do not seem to, the tautology is only apparent. If *A is A* is the correct formulation of the 'law,' therefore, identity is unmeaning, and no principle of thought.

But need the law of Identity mean this? Yes, if by 'identity' we mean an *absolute* identity to the exclusion of difference. But need we mean this? Formal Logic hesitates. It would like to retain its belief in absolute identity, yet it is too plainly destructive of all significant assertion. No judgments ever really intend to assert absolute identity. Even tautological propositions like 'Boys will be boys,' or 'As sure as eggs is eggs,' are understood to assert identity with a difference. Clearly, therefore, in logical use there is no identity which is absolute and devoid of differences. But if identity is not absolute, *to what is it relative*?

Without seeking to answer this question, Formal Logic often comforts itself with the idea that all will be well if it admits that identity must somehow come to terms with difference, and accepts the Hegelian dictum that 'all identity is identity in difference' as the final word of wisdom. At this point it stops exhausted, and frequently relapses into its original position that an inquiry into the question whether any 'A' has changed sufficiently to invalidate an argument based on its 'identity' may be burked by pointing to the fact that it is still *called* 'A.' It will hardly then understand a conscientiousness that inquires further. Yet the Hegelian response seems both oracular and irrelevant. For what does the 'identity' in the 'identity in difference' mean? If it is itself an 'identity in difference' we are bidden to define identity by itself; if it is an absolute identity, we have not after all exorcized that phantom monster. And in neither case have we been told what identity means, nor why the situation should have been described as an identity pervading differences, rather than as differences breaking out in what was *falsely* taken as an identity.

Whether what is *called* an identity is an 'identity' or a 'difference' seems wholly arbitrary. For, seeing that in every pair of things called 'A' there is always both identity and difference, there is no reason given for calling them identical rather than different. We thus arrive at the consoling (though surprising) result that 'A is A,' instead of convicting all real judgments in the form 'A is B' of contradiction, now makes self-contradiction impossible. For if all differences are differences-in-identity and all identities identities-in-differences, is not everything both, and has not the difference between identity and difference wholly disappeared? So our perplexity forces us to ask further—What is the difference between calling a thing 'identical' and calling it 'different'? Seeing that identity is never absolute but a matter of degree, *what degree* of identity justifies us in calling a thing 'identical,' and *what degree* of difference in calling it 'different'? Or otherwise what degree of difference destroys identity,

and what amount of identity overrides difference? To none of these questions are answers forthcoming; and, moreover, even if there were, they could not be self-evident; yet without them the Principle of Identity would seem to be unmeaning.

We are still far, moreover, from an answer to the question—*How* can identities persist through change? The only direct illustration of what this may mean is afforded by the familiar case of our own identity. This certainly is not an identity which excludes change. We believe ourselves to change all through, and yet to remain the same. But how far does this example profit Logic? Is 'the same' always of this sort, and does it really change all through? Are terms and judgments, then, also subject to the flux, incapable of the ideal rigidity Plato postulated, and capable only of a functional equivalence in their several uses? (Cf. Chap. VII, § 8.) If so, we should have broken through logical conventions with a vengeance, and rendered every assertion of identity an experiment.

Yet it may be so. Only is not Formal Logic bound to perish rather than admit it? Even if it could endure the thought that an assertion of identity is *never* 'self-evident,' because when the judgment is made there must always be a doubt whether the situation formerly described as 'A' is sufficiently like that now to be described as 'A' to render the predication successful, would it not abhor the inference that an arbitrary act of choice is inherent in the making of every judgment? For once it is admitted that the 'identical' changes and exhibits differences, *either* of its aspects may be selected. It becomes arbitrary, therefore, whether we choose to call it 'the same' or 'different,' and why we should do the one rather than the other becomes an unfathomable mystery for Formal Logic.

To sum up: (1) to say baldly that 'A is A' is meaningless; (2) to say that every A is identical with itself is perhaps to describe identity, but certainly to provoke the question—*How*? If the answer is, 'By

remaining unchanged,' the retort is 'Impossible!'; if, 'By persisting, *modified*, through change,' it becomes optional and arbitrary whether we call it 'the same' or 'different.' Thus the definition of 'identity' would seem to coincide with that of 'difference.' (3) If, lastly, we try to *apply* these notions of identity, we get varying results. The 'identity' which is *exclusive* of change does not seem to apply to *thoughts* or *things* at all, but only to *words*—so long, at least, as their (dictionary) meaning does not change. The 'identity' which admits of change applies to thoughts as well as to things, but seems to be merely another name for 'difference.'

Neither of these results can possibly seem wholly satisfactory to Formal Logic. But there can be no doubt which it must prefer. With its belief that every name has (or ought to have) one single rigid meaning, and that every proposition has a meaning which its context cannot change, it is bound to prefer a sense of Identity which is restricted to words but accords with its inveterate verbalism.

§ 6. *The Principle of Contradiction*

The meaning of this principle seems less unfathomable. (1) Regarded as a principle of being, it is confronted by the same difficulties of application as the principle of Identity. And for just the same reason. Because all things change, they not only fail to preserve their identity, but also succeed in assuming contradictory attributes. Consequently the maxim that a thing cannot both be and not be A will only hold in cases where the thing has not changed since it was A. Hence discretion and infinite precautions are needed to apply it, nor can it ever be asserted without a risk of *de facto* failure. Formal Logic, we have seen (§ 3), is forced to recognize the need of precautions; but those it takes are insufficient. If it frankly admitted into its statement of the principle all the qualifications which may be relevant in its actual use, it would cease to have any impressive-

ness or meaning in the abstract. We should have to say, *e.g.*, 'A cannot be A and not-A at the same time, in the same place, in the same respect, in the same reference, in the same context, for the same persons—in short, under precisely the same circumstances; but probably such an ideal case never occurs,[1] and for heaven's sake don't ask me how little difference in any of these respects may enable A to be not-A!' Yet it is clear that any such difference *may* vitiate an attempted application of the principle. The exact point at which a dog that 'eats bones' will, from sheer repletion, refuse to eat another may baffle not only a Formal logician but the best canine psychologist. Yet the bone may be quite a little one. Or again, if I say 'It is hot,' and you 'It is not,' both judgments may be true as intended. For the reference in each case may have been to the assertor's feelings, and to those of similarly constituted persons. The universality and objectivity which each judgment claims did not refer to the feelings of a widely different character. I should admit I was not thinking of salamanders, and you that you had not been solicitous about the feelings of a polar bear. Yet we might both have been mistaken as to the other's feelings, and, for the purpose of the judgment, differ as decisively as the salamander from the polar bear. Clearly, therefore, the principle of Contradiction must not be used to dogmatize about reality, and the more it is kept out of metaphysics the better for both parties.

(2) Regarded as a principle of thought, it defines the difference between affirmation and denial. Now it is an important fact, of a psychological sort, that affirmation and denial (in a sense) exclude each other. But it does not follow from this (as we saw in § 2) that verbally contradictory forms of affirmation and denial are incompatible. For we can never take it for granted that these forms express the real meaning of the judgments. For example, though a Formal logician might successively

[1] Not to mention the awkward fact that if it did occur, it would be an 'absolute' identity reducing the principle to the tautology it is trying to disclaim.

assert that every judgment asserted an identity, and that no judgment did, he would think it unfair to be on this account charged with self-contradiction. Even, however, where the two contradictory propositions were intended in their literal meaning, we saw that the result would not be two contradictory meanings but no meaning at all, just because there is a contradiction (§ 2).

Moreover, curiously enough there is, in spite of all this, a sense in which, even formally, affirmation and denial do *not* exclude each other, but imply each other and go hand-in-hand. For in the very act of affirming the identity of A we are defining it over against not-A and excluding not-A from it. Thus every assertion includes a denial, *omnis determinatio est negatio.* Nay, it seems to deny far more than it asserts; for 'not-A' includes all the world but A, if A is taken literally, and all but what can be predicated of A, if it is taken leniently. Similarly in denying we are really affirming by narrowing down the region in which A may be found. Thus to affirm is at the same time to deny, and to deny to affirm; the very law of Contradiction seems to demand its own abrogation. The paradox of the situation is well calculated to provoke that philosophic stupor which appears to be the end of philosophy as commonly understood, and Hegel had the wits to exploit it. But though he was extensively accused of denying the Law of Contradiction, his argument was not refuted. Still he did not propound a principle that should be both applicable and undeniable, and nothing less than this can content Formal Logic.

§ 7. *The Principle of Excluded Middle*

In dealing with things this principle is, of course, involved in just the same embarrassments as the rest. Things not only change, but often change insensibly. Hence the drawing of the line between A and not-A becomes arbitrary, and the appeal to the Excluded Middle to decide questions of fact seems inept. What

should we think, *e.g.*, of a Stoic philosopher propounding his favourite demonstration that death is nothing to us, because we must be either dead or alive, and so long as we are alive we must be enjoying life, while once we are dead we are past feeling? Or of a doctor assuring a dying man's wife that he was certainly either dead or alive, and could not be both?

Regarded as a principle of thought, the Law of Excluded Middle is supposed to guarantee that there is no alternative to affirmation or denial. But this is only true if the conditions of actual thought are abstractly simplified to an enormous extent, and a number of covert assumptions are allowed. It is not in practice necessary to choose between affirming A and denying it, because (1) it is not necessary to think about A at all. A *will to think*, therefore, must be assumed before the principle can get under weigh. And this notoriously is not always found. For after all no one can be *forced* to think, as others besides schoolboys are perfectly aware.

(2) A will to think things *together* must be assumed for the 'law' of Excluded Middle as for that of Contradiction. It is perfectly easy to cherish contradictions in one's mind, provided that they are kept apart, and not allowed to meet. On this condition even the most cogent inferences cease to be necessary. No one can be compelled to admit even that $2 + 2 = 4$, so long as he can refuse to add them. Most people, unconsciously or deliberately, make extensive use of their power to keep apart what it is inconvenient to bring together, and this accounts for the vast masses of 'inconsistency' we all discover in other minds than our own. Logic, of course, cannot approve of this practice, but need it refuse to observe the fact?

(3) A will to *judge* must be assumed. Otherwise suspense of judgment forms an alternative to 'it must be either A or not.' Before judgment can be passed the doubt-inquiry stage of the problem must be over. But it rests with us to say when this shall be, and it need never be unless we choose. Even when the alternatives

have been quite distinctly formulated, it is possible to argue: 'Such and such considerations impel me to assert that this is true; such others that it is not; both arguments seem valid. Yet if both are true, they must be consistent, for truth is consistent. It is true that I cannot at present apprehend how they can be brought into accord; but that is no reason for rejecting either; let me go on, therefore, affirming both, and trust to time to evolve the higher synthesis which will remove the contradiction.' Even eminent philosophers may be found to argue thus without confessing to logical suicide; at any rate it is clear that Formal Logic cannot compel us to judge.

(4) Injudicious application can easily make the principle of Excluded Middle look somewhat foolish. We might, for example, set out solemnly to affirm that a dog was either a rat or not, and if not that, either a sausage or not, and if not that, either a fallacy or not, etc. This method of inquiry does not seem likely to lead to any valuable information about dogs. Nor is it found in real life. The fact, then, that strict Formal Logic sanctions it would seem to show that some important consideration has been overlooked in its scheme. In point of fact, significant affirmation and denial always imply a common genus and a *suppositio* as to the scope of the inquiry. It is because the sphere of relevant judgment is thus limited, because 'not-A' is never understood to mean the rest of the universe, that negations and alternatives can advance the work of science. But the precious principles of Identity and Contradiction convey no hint of the fact, and Formal Logic cannot say what determines the sphere of the inquiry. It is debarred from admitting that it is the *interest* of some inquirer.

§ 8. *The Principles of Thought as Postulates*

Are, then, the 'Laws of Thought' unmitigated nonsense? Surely where there is so much smoke there must be some light; but the question shows that we have become

critical and are ripe for a real solution of the problem. It is necessary to renounce entirely the Formal conception of their function, in order to see that they really are principles of thought and play an essential part in the functioning of our intelligence.

(1) We shall then discover that in the first place they are neither 'laws' of the way in which we all think, nor 'canons' for thinking rightly. The third alternative hinted at in § 2 is that they are *postulates* we can use advantageously.[1] Now a postulate differs in important respects both from a 'law' and from a 'canon.' (*a*) It requires the intervention of *a will*. There is no compulsion about adopting it; if it is not willed, it is no necessity of thought. If it is willed, on the other hand, it can not only appear to be universal, but can maintain itself against an indefinite amount of hostile experience. (*b*) It thus seems to be in a way 'independent' of experience. Experience is allowed to confirm it but not to invalidate it, and it is none the worse, if events do not wholly conform to it, so long as they conform sufficiently not to impair its usefulness. Thus the mere discrepancy of experience does not refute a postulate. Hence it is often supposed to be 'self-evident.' But a critical logic will never accept a principle on the strength of the merely psychological criterion of 'self-evidence.'

§ 9. *The Purposiveness of Thought*

(2) Formal Logic fails to recognize the volitional nature of our postulates, because it has throughout systematically shut its eyes to the constant intervention of volitions in the course of thinking. It has thereby irrevocably pledged itself to make nonsense of the theory of any process of thought which depends on such intervention. It insists on calling purposiveness 'arbitrary' and is rewarded by finding that all purposive thinking is 'arbitrary' and that none of its own explanations will work until they are represented as 'arbitrary' and irrational.

[1] Cf. generally my *Axioms as Postulates*, especially §§ 11, 26, 28-34, 36, and 48.

It has to regard as 'arbitrary' all its distinctions of Terms (Chap. II, §§ 6, 11), all practicable definitions and divisions (Chap. VI, §§ 4, 9), all inference as such (Chap. II, § 1, Chap. XIV, § 5), the selection of relevant points of identity or difference (§ 5), the drawing of the line between A and not-A (§ 7), etc. The obvious cure for all this manufactured irrationality is to recognize thinking as the thoroughly purposive, selective, and personal process it is, and to *deny* that it is thereby vitiated. But this remedy Formal Logic has *arbitrarily* debarred itself from trying.

§ 10. *Identity as a Postulate*

If the principle of Identity is formulated as a postulate, it is found to demand that *A shall be A* and that a judgment *shall be* capable of being 'identical' (*i.e.* identified) with itself. This, of course, implies that the cases of 'A' *need not* be, and *prima facie* are not, wholly or absolutely identical or indiscernible in their various occurrences. It admits that they are not bare 'A,' but A^1, A^2, etc., as they actually appear. It admits, therefore, that appearances are against 'identity,' that all things change, including the 'cases' of A, and the recurrences of the 'same' judgment. But it asserts that nevertheless, *in spite of these differences*, it shall be possible to treat them as cases *of A*, as recurrences of the same judgment, and to argue from one 'case' to another by substituting A^2 for A^1, and assuming that the differences in the contexts of the two judgments are irrelevant for the purpose of the argument.

Evidently these postulations of identity are affronts to experience and defiances of change. They are adventures of thought and always involve a risk. For it may always turn out that the differences are *not* irrelevant. Indeed it is this risk that gives real significance to the assertion of identity. If identity were 'self-evident' and a matter of course, we should not trouble to assert it. But because a doubt is cast upon it by the existence of change, the discovery of an identity that holds, and holds events together, becomes valuable and important. Just

because all reality is in a flux, because things, ideas, and meanings are continually changing, it is so immensely important to affirm that nevertheless predication is not frustrated, because there is *enough identity* to argue from. It is not absolute identity, of course, that is wanted ; for that would be as useless as it is inconceivable. Nor is it a ready-made identity passively floating in a pre-existing sea of differences. It is an identity *which has to be made*, or differentiated and made relevant by an act of selection, at peril of our truth, and ultimately of our life, every time it is used. For it is never an abstract identity, but always relative to the purpose of an argument. For example, the two peas which seem indiscernible to a maker of proverbs may be very different for the purposes of a Mendelian gardener. Or, again, it is clear that whether we answer *yes* or *no* to the question, Do two persons ever see the same rainbow ? depends on how we decide the question whether the optical differences of their rainbows are logically relevant, so that for some purposes rainbows may be 'identical' and for others not.

Thus the postulate of Identity does not mean that identities are ever found or given as facts, nor confound the 'identical' with the indiscernible. It means that in some cases we may, with our eyes open, neglect differences between *similars*, and *substitute* one for the other. When we argue from one 'case of A' to another, we mean that we believe them to be *equivalent for our purpose* ; *i.e.* we use them as 'identical' cases of the 'same' A. Of course we should not succeed with this procedure unless there were cases which submitted to such treatment ; but it is from experience alone that we can learn *which* they are and *that* there actually are objects of thought and words and judgments which can be treated as equivalent in different contexts. This does not imply that they are unchanging, but only that their changes may be irrelevant or insufficient to frustrate the inference. Nor does it mean that every alleged identity turns out to be real, for of course the similarity, on the strength of which identity was postulated, may turn out to be insufficient : but it is

just this possibility of error *in its application* which saves the principle from becoming a tautology, and gives a meaning to its claim to be a principle of thought.

We see then that Identity is always the result of a voluntary operation performed on a given similarity, which fits it for the purpose of reasoning from it, and that it is not necessary that the identical should be immutable. It is enough that the attempted substitutions should function successfully.

As for the predication-puzzle, the solution is simple. No predicate is ever attached to a subject except for a purpose. When, therefore, we judge that A is B, we mean that for our purpose the quality B may stand as the essence of A. We do not mean that *out of this context*, and apart from the occasion of the actual assertion, B in general may be identified with A in general. We do not assert that they are *absolutely* identical even now. We do not deny their differences (and especially not their *verbal* difference), though we take them to be irrelevant. Similarly, in affirming the self-identity of A, we are not denying that various predications may be made about it, or asserting that it may not be also B and C and D, etc. We are intent only on getting an object of thought definite and stable enough to attach predicates to, to accept some and to reject others. Indeed, what we are really trying to do is to find out what attributes A will tolerate, and what not. To discover this we have to make the assumption that A has a nature of its own, which is not indiscriminately hospitable to every predicate. If A were such that anything whatsoever might be predicated of it, it could not mean anything, because no predicates would really attach to it. It would be anything and everything and effectively nothing.[1] Clearly, if such were the nature of reality, it would be unknowable. Hence it is a postulate of knowledge and of significant predication that the world should allow itself to be set in order by predica-

[1] This is the ultimate logical reason why monistic metaphysics, assertions about the Absolute, and the identification of 'God' with the totality of reality, all in the end mean nothing.

tions about what things are and are not. Thus the practice of predication becomes intelligible, without ascribing to things and thoughts either the absolute fixity which Plato demanded in vain, or such fluidity that it is wholly arbitrary and indifferent whether we take them to be the same or different. Plato was right in thinking that it is the essential function of the intelligence to 'fix' the flux, and wrong only in thinking that it needed fixing absolutely, and not in relation to human purposes. This very relation, however, implies the flexibility in identities which makes the principle of Identity significant.

§ 11. *The Principle of Contradiction as a Postulate*

The principle of Contradiction must similarly be viewed as a demand that A shall exclude not-A; but this so far settles nothing as to how A and not-A are to be understood. A cannot indeed be understood as excluding everything but bare (verbal) A, for that again would render predication invalid. Let it be understood, therefore, as including whatever can be truly predicated of A, and as excluding only what is incompatible with its existence. We can then defend the predication *A is B* on the ground that B belongs to A, or more precisely that in the total situation, in which a part is singled out as A, B is connected with it, and can defend the singling out of A as necessary to the truth of the predication. For unless 'A' were conceived to be capable of excluding some predicates while accepting others, no meaning could attach to any statement about it. Any object of thought must be conceived as distinct enough to discriminate between what it is and what it is not, *i.e.* between true and false attributes ascribed to it. That is the meaning of both the demands, that it shall be 'itself,' and that it shall repel its 'other.'

The facts in nature on which this postulate is based are that there are distinguishable objects and incompatibilities of existence, and an immediately experienced difference of attitude between affirmation and denial, which is a

psychical fact. Certain predicates do exclude each other, and when I assert the one, I mean to deny the other. It is worth while, therefore, to try to map out the mutually exclusive predicates, in order to know what to expect from the course of events. Of course, this does not mean that any given reality will allow its attitude towards the rest of the universe to be quite sharply defined, nor that any attempted predication may not be wrong; it only asserts that our postulate has an application and a use. The fact of change renders it impossible to regard the principle of Contradiction as a fact; it makes it into a postulate, and imports a risk and a meaning into its applications; but it does not destroy its use so long as we remain willing to learn from experience.

The paradox that affirmation denies and denial affirms (§ 6) disappears when the purpose of our postulate is understood. For we then see that there is neither 'identity' nor 'contradiction' *per se*, and without reference to a purpose.

When we apply the principle to the interpretation of experience, there is nothing to compel us to regard two 'events' as both 'cases of A,' or to regard it as 'contradictory' that A should have changed into B. It is our thought that has isolated these 'events,' and connects them together again for the purposes of organizing its experience. And for our purpose it is clear that to affirm and to deny are the same thing neither as experiences nor in intention, and that both are useful for this organizing of experience and play into each other's hands, once we have *selected* a *limited* genus within which our affirmations and denials can operate. But in the Formal statement it is not true that affirmation denies *every* not-A, or that denial goes to affirm any A—for the simple reason that both not-A and denial are infinite and Formal affirmation and denial are not significant. In real thinking there is always a limited reference which destroys the paradox. For why should it be remarkable that if we assume that in a certain

subject there are a limited number of alternatives, of which one has to be selected, we may get at it either by picking it out at once, or by rejecting the other alternatives? The 'self-contradiction' of the 'law of Contradiction' thus reduces itself to the familiar fact that selection involves rejection.[1]

§ 12. *Excluded Middle as a Postulate*

The principle of Excluded Middle demands that it shall be possible to draw the line between A and not-A so sharply that nothing intermediate shall be conceivable, and to force an option between affirmation and denial. Manifestly in either form the postulate rests on the fact that there are cases where sharp distinctions can be drawn, and where we have practically to decide *yes* or *no*.[2] Clearly, therefore, it may be a convenience to postulate these conditions in other cases also where they are not known to exist, even though it is never a necessity of thought that we should assume them (§ 6). The significance, responsibility, and risk of applying his postulate to a possible case rests, as before, with the assertor, and depends on the purpose of his thinking. For example, 'to be or not to be' were exclusive alternatives for Hamlet, meditating on suicide, only because for the purpose of his meditation he had thought fit to identify 'being' with existence in the physical world.

§ 13. *Conclusion*

The conclusion that the 'laws of thought' are postulates, and neither facts in nature, nor even necessarily

[1] There is, however, an attractive alternative to taking the Principle of Contradiction in this way as a Postulate of Truth. It may be taken as a *Law of Meaning* which asserts, not that 'A is B' and 'A is not B' cannot both be *true*, but that they cannot both be *meant* (cf. § 2). Similarly the Principle of Excluded Middle may be interpreted as asserting that either A is B or A is not B must be *meant* to be asserted. The fact that both have been so loosely conceived that they may be taken either as postulates of truth or as laws of meaning is a curious comment on their alleged 'self-evidence.' But Formal Logic cannot conceive them thus, because it treats meaning as 'psychological,' and does not admit it into 'Logic' (cf. Chap. XXIV, §§ 5, 6).

[2] Never *theoretically*, because it is always thinkable that a refusal to answer might be persisted in even at the cost of life itself.

applicable to all reality, will perhaps be thought to reduce their truth to the level of (more or less) successful fictions. And certainly they are not 'true,' if it is the business of thought to correspond with reality. For they make no attempt to 'copy' reality; they openly and 'arbitrarily' idealize certain features in it, and demand that reality shall conform to these ideals, although it plainly never does. However convenient then they may be, they cannot be more than fictions.

This criticism would be final, if it were indisputable that it is the function of thought to copy reality. If, on the other hand, it is the business of thought to operate on reality and to transform the flux in our eyes by drawing our attention to its relatively permanent features, by selecting which we may control it, it will not seem obvious that the devices of our thought have failed to attain to truth. For 'truth' will then mean these very assumptions and devices by which we operate on reality and control the flux. They will be precisely what constitutes the difference between 'truth' and 'reality.' The postulates of thinking, then, cannot be described as fictions so long as they work, so long as we judge it well to think before acting, and to reflect on experience. Their partial failure must be set down, not to their own lack of truth (for before it can be suggested that we can make *truer* assumptions it ought to be shown that *others* can be made), but to the recalcitrance of Reality. But their failure is bound up with their success; and the idea of making them indisputable by making them inapplicable could only have occurred to Formal Logic.

CHAPTER XI

THE FORMS OF JUDGMENT

§ 1. *The Classifications of Judgments*

FORMAL Logic bases its division of judgments on differences in their QUANTITY, QUALITY, RELATION, and MODALITY.

(1) On the basis of *Quantity* it distinguishes between judgments *universal*, *particular*, and *singular*, according as they are about the whole, a part, or a single case of their subject. '*All* units are equal,' '*Some* cherry-stones float in water,' '*The first priest of Diana Nemorensis* was a runaway slave,' would serve as examples.

(2) On the basis of *Quality* judgments are divided into *affirmative* and *negative*, *e.g.* 'Some cherry-stones float in water,' 'Some cherry-stones do not float in water.'

(3) On the basis of *Relation*, judgments *categorical*, *e.g.* 'The wish is father to the thought,' *hypothetical*, *e.g.* 'If wishes were horses, then beggars would ride,' and *disjunctive*, *e.g.* 'Numbers are either odd or even,' are recognized.

(4) As regards *Modality* judgments are *assertoric*, *problematic*, or *apodictic*, *e.g.* 'It is true,' 'It may be true,' 'It must be true.'

§ 2. *Are they Forms of Judgments or of Propositions?*

The first and most serious doubt about the value of these schemes of classification is raised by the question whether they are forms of Judgments or of Propositions. To prove that they are the former it would be necessary to show (*a*) that each form fully expresses the meaning

of its assertor, and (*b*) that it does not express more meanings than one. If it should be capable of expressing a plurality of meanings, it is clearly nothing but a *verbal* form for conveying alternative meanings, and in any case of its actual use its meaning will have to be determined from its context. If, therefore, Formal Logic treats these forms as 'ambiguous' and incapable of distinguishing between very different meanings, and discusses what they may mean and ought to mean, it is in reality confessing that they are only forms of words, and propositions, not judgments.

We shall see that in each case it is forced to this confession, and that even so it can offer no guarantee that the meanings it specifies exhaust the possibilities. An exhaustive catalogue of the meanings of judgments would no doubt be a very formidable undertaking, because it would involve a reference to the actual context, and a psychological study of each assertor's state of mind; and moreover, the simple categories of Formal Logic seem ill-fitted to cope with judgments which may have, and may be intended to have, more than one interpretation, and may convey one meaning only a little more obviously than another. But if Formal Logic is not disposed and equipped to deal with the complexities of actual meaning, it should openly confess that it is dealing only with forms of speech. Even these it can manipulate only by doing violence to their natural expression, and by postulating a number of conventions which language does not observe. Instead of confessing its verbalism, it first abstracts from the actual meaning of the judgment in its personal context, and substitutes for it a 'logical meaning' constructed by these conventions, and then undertakes to fix this logical meaning for good and all from a mere contemplation of the form of words.

§ 3. *The Forms of Quantity*

The classification of judgments into universal and particular is neither linguistically nor logically satis-

factory. Linguistically it is objectionable, because it cannot deal with the *indefinite* propositions which leave the quantity of the subject indeterminate. The Formal logician arbitrarily asserts that the subject must be quantified before he will consider its meaning, but does not observe that in so doing its meaning may be altered and falsified. When, *e.g.*, it is asserted that 'women are variable,' or 'logicians are inconsistent,' the assertor may not yet have made up his mind whether his remark applies to '*some*' or to '*all*,' or to what percentage: the request to quantify the subject may demand from him a further act of thought and a difficult research which he has neither the means nor the need to perform. On the other hand, an assertor is often in a position to make his assertions far more definite than the vague *some* which is all that Formal Logic finds it convenient to recognize. A statistician or a biometrician will justly despise a mere statement that 'some men marry,' and will state the marriage-rate per thousand of the population exactly, and in many cases the subject habitually indicates its quantity ('a few,' 'most,' 'nearly all,' 'all except one,' etc.) far more precisely than the logical 'some,' which ranges technically from 'at least one' to 'all but one.'[1] Here, then, is a mass of actually expressible and habitually expressed knowledge, which Formal Logic simply throws away because it has found no way of utilizing it.

Logically it is admitted that the 'universal' forms suffer from much 'ambiguity' (*i.e.* plurality of meaning). 'All trespassers will be prosecuted' may be 'enumerative,' 'truly universal,' or 'hypothetical.' *I.e.* it may mean (in extension) a threat against certain persons; it may enunciate (in intension) a general connexion between trespassing and liability to prosecution, or it may mean '*if* caught trespassing, then prosecuted.' It *can* mean *all* these things, and which of them it actually *does* mean on any occasion depends on the context. In other words, it is clearly a form of words.

[1] Indeed, for some Formal purposes, 'some' covers 'all' (cf. Chap. XII, § 1).

Formal logicians, especially those who try to conceive their subject as scientific, sometimes attempt to stave off this inference by contending that though the universal proposition may have all these meanings, yet it should more rightly or properly be understood in one of them. So they lay it down that, *e.g.*, universal propositions should be interpreted in intension, particular in extension, and enlarge on the superior scientific value of universal propositions, until even a cautious man becomes almost ashamed of his reluctance to say it is all or nothing.

It would be premature here to examine the confusions of thought which underlie this doctrine (Chap. XVI, §§ 12, 13), and it is, at any rate, enough to show that it is quite irrelevant. For, from the logical standpoint, the function of a proposition is to convey a meaning, and if it is successful in so doing, it is as good a judgment as could be desired. If it conveys the meaning intended, it fulfils its purpose and validates its form, whatever it may be. Surely it cannot be contended that it will be improved by using a form which *fails* to convey its meaning? How can the use of a universal form be held to palliate ineptitude in expressing one's meaning? And even if it were true that universal forms were best used for scientific purposes, it would not follow either that particular forms were logically unsound or reprehensible, or that the mere use of a universal proposition rendered one statement more valuable than another which was expressed in a particular form. Why should it be logically more reputable to assert a universal proposition which is false than a particular one which is true? The question, What is the right judgment to make on this subject, and how may it best be expressed? is always a question of fact, and its decision requires 'material' knowledge and a knowledge of human psychology. It cannot be answered by mere meditation on the forms of propositions, and it is illogical to call a particular judgment which serves its purpose 'incomplete' because we believe that for certain other purposes a universal form of proposition would have been used.

§ 4. *The Forms of Affirmation and of Negation*

The fundamental psychic fact underlying the classification of judgments on the ground of *Quality* is, of course, the difference between affirmation and denial. This difference of attitude is the real basis for the postulate of Excluded Middle, and is so pronounced that it is hardly possible that any one should, in judging, be unaware that he is either affirming or denying. Indeed, he is probably aware also of the motives that have conducted him to the judgment he is formulating; he knows, *e.g.*, whether he is simply asserting what seems to him an obvious fact, or denying what is an obvious error, whether his denials and his affirmations are confident or hesitant, whether he is asserting in order to deny, or denying in order to assert. Clearly there are enormous differences of meaning behind the simple words of his assertion, and if his audience do not share in his immediate awareness of his real meaning, the subsequent course of his thought may ordinarily be trusted to enlighten them.

But in the *forms* of affirmation and denial none of these important differences can be preserved. The most casual observation and the most closely reasoned reaffirmation of a contested truth will both appear as 'affirmative judgments.' The most perverse contentiousness and the most profound criticism will both have to express themselves in negations. We need, in short, knowledge of the actual context to understand the actual meaning of a judgment, and whether it is positive or negative. Consequently the *forms* of affirmation and negation become 'ambiguous,' and cease to be unequivocal guides to the actual meaning. Formal Logic has once more dropped from the Judgment into the Proposition, and can return to the latter only by considering the actual reasoning in its context.

§ 5. *The 'Subjectivity' of Negation*

If thought were merely the mirroring of a static and unchanging 'Being,' and perfectly fulfilled this function,

there would be no room for negation. It would merely have to affirm what *is*, once for all, and for ever after hold its peace; it would not have to extract subjects and predicates from a chaotic flow of happenings, nor to guard against the confounding of one thing with another (indeed, there could hardly be for it a plurality of 'things' at all), nor to provide a truth that was adjustable to the changes of reality. 'Thought' would be so completely adequate to being that there would no longer be any *thinking* (which itself is a form of 'becoming'), and whether the system of eternal and immutable 'Ideas' were called 'ideal' or 'real' would make no difference at all to their superhuman nature.

But as it is neither the nature of being to be changeless, nor the nature of thought to mirror it and so to win exemption from the trouble of thinking, we cannot acquiesce in a single all-embracing affirmation of what is, nor think by affirmation alone. The flux of experience has to be analysed, and 'things' have to be fished out of it by thought, and distinguished from other things, nor is there any end to the distinctions we may have to make in what at first we took to be 'the same.' Discrimination or Selection, therefore, becomes the essential function of thought, and as we saw in Chap. X, § 11, selection implies rejection. Now the great instrument for expressing these rejections for human purposes is negation. The 'A' we want to bring out has to be fenced round against the influx of what would destroy its more or less artificial distinctness and re-engulf it in the flux, by a series of negations which declare what it is *not*. Of such negations a *finite* number must always suffice; for if the 'not-A' were conceived as infinite, negation could never fulfil its purpose of defining the 'A' we have made an object of our thought.

It seems clear, therefore, that negation is always a 'subjective,' or better *human* device of thought. It is a confession of human weakness that cannot go direct to the positive core of reality. It is a tribute to the instability of being. It is always relative to human purposes. It

is never attributed to reality *per se*. We never suppose, when we have once been allowed to substitute formal examples for real problems, that because it can 'truly' be judged that 'a man is not a tea-tray nor a syllogism,' there must be attributed to man specific qualities of excluding syllogisms or tea-trays. Of course in actual thinking such bizarre denials do not occur. We do not deny at large, but remain within a limited *suppositio*, determined by our interest for the time being. Thus the constitution of that *suppositio* is itself a further act of human selection, and only emphasizes the human purpose of negation. How, then, is it possible to give any intelligible account of negation on the Formal assumption that its human aspect must be ignored?

Of course philosophers have tried. Plato in the *Sophist* tried to conceive negation objectively. Each 'Idea' (concept) was to contain an infinity of 'not-being,' but its 'not-being' was not to be its 'contrary,' and therefore to exclude it, but its 'other,' and therefore to be predicable of it. But apart from the fact that this does not explain the real crux, viz. why an 'Idea' admits of some Ideas and excludes others, Plato had unfortunately failed to observe both that negation never operates with an infinite 'not-A,' and that he had made his system of 'Ideas' so absolute as to make predication as such a wholly human function. However, he never seems to have been quite satisfied with his accounts of the 'being' of 'not-being,' and the logic of his theory certainly demanded a complete Eleaticism.[1]

§ 6. *The Forms of Relation*

That the classification of Judgments into *categorical*, *hypothetical*, and *disjunctive* is full of ambiguities Formal Logic is not unaware. It recognizes that the simple unqualified assertion of fact which it calls *categorical* is

[1] What part Hegel really meant negativity to play in reality it is very difficult to say, because it touches the fundamental ambiguities of his position. The point is still in dispute among his disciples and need not perhaps be discussed by us.

by no means easy either to get or to detect. The categorical form may be assumed by disguised hypotheticals. 'Perfect happiness is complete adaptation to environment' does not assert that such happiness and adaptation exist. It means rather that *if* there were the one, there would be the other. Conversely, a use of the hypothetical (or 'conjunctive') form does not necessarily mean a lack of dogmatic assurance. 'If equals are added to equals their sums are equal,' Euclid could confidently declare, without a suspicion of the psychological difficulties lurking in the notion of equality.[1] And the ordinary logician usually classifies 'laws of nature' as hypothetical, though he does not feel them to be at all precarious. Yet there are also real hypotheses felt to be such, which serve to express real doubts and demand real concessions. 'If you accept me, I shall be happy,' for example, must sometimes pop an *open* question. '*If*,' then, is 'ambiguous'; it may merely assert a condition, or it may express a real doubt. '*The* hypothetical judgment,' therefore, becomes a verbal form for conveying a plurality of meanings.

§ 7. *Are the Forms of Relation Exclusive?*

If the Formal classification of the forms of Relation is to hold good, the classes it constitutes should be exclusive. But Formal Logic confesses to doubts. (1) All the forms seem to be to some extent 'categorical.' Even genuine hypotheticals seem to involve a positive assertion. They assert a condition as a fact; 'if you accept me, I shall be happy,' deduces a categorical consequence from its doubtful clause, and 'if he had sold, he would have made money,' conveys categorical information about the state of the market. So, too, disjunctives assert a basis in fact of the disjunction; thus, 'it is either typhoid or malaria' implies that it is at all events a fever. Yet 'snarks either have feathers and bite or have whiskers and scratch' would suffice to show that a disjunctive form

[1] Cf. Chap. XVI, § 11.

does not guarantee existence in anything but a universe of diction.

(2) Conversely, all categorical judgments may be held to be in a sense hypothetical. They try, no doubt, to convey positive information, but do they succeed? Are the facts such as they assert? This latter doubt may perhaps be set aside as irrelevant to the Formal standpoint. For the question it raises is not as to the truth-claim of a judgment, but as to its actual truth. And this, we saw (Chap. I, § 4), is ruled out by Formal Logic. No doubt every judgment is experimental and takes a risk in claiming to be true and to be applicable to reality, and this is precisely the reason why it is made; but to call it 'hypothetical' on this account is to use the word in a different sense from that originally professed. It no longer expresses a formal doubt, which can be treated Formally, but a real doubt, which can only be tested by experience. Moreover, in the 'hypothetical judgment' its maker's *intention* was *not* (primarily at least) to make a 'categorical' assertion, while in the 'categorical judgment' it is, and there was no intention to *express* the possibility of failure which is incidental to all significant judgment.

(3) Verbally, it does not seem to be true that the 'either . . . or' of a disjunction excludes the possibility of 'both.' Indeed, in cases where this does not vitiate, but confirms, the argument, there is no reason why we should attempt to make the reasoning exclusive. 'If he is either a fool or a knave he will do this.' But he is both. Then *a fortiori* he will do it.

Hence, even disallowing the second objection, it is clear that the Formal classification of judgments of Relation is very defective.

§ 8. *The 'Subjectivity' of Hypotheticals and Disjunctives*

The 'subjectivity' of Judgment which Formal Logic tries vainly to abstract from is very evident in the judgments of Relation. For even though the categorical

judgment might at a pinch pass for a mere reflexion of reality, if no inquiries are made as to why we make it and how we are to know when it is really categorical, yet hypotheticals and disjunctives do not look as if they could possibly be meant as statements of objective fact. 'If he is alive, he will come back; but he must be either alive or dead,' may enable us to draw inferences from the course of events, but there cannot really be an 'if' about his being alive, nor can 'either dead or alive' express a real alternative.[1] If only we knew the facts more fully, we should assert positively that he was alive or that he was dead, and proceed at once to our inference, without having to wait upon events.

It is clear, then, that the suppositions, assumptions, and alternatives which Logic studies are human attitudes towards the objects of our thought which are conducive to the operations we desire to perform upon them.

But in the actual use of the categorical form there is also implicit ineradicable subjectivity. If the verbal form *S is P* be contemplated in abstraction, it does indeed seem obvious that it is quite as independent as Formal Logic wishes to believe. But if it is conceived as an assertion actually made, it is at once transformed. Its assertor may then be asked at once—'Why did you say *S is P*, and not *S is Q* or *X is Y*?' He will have to confess that he selected *S is P* in preference to any alternative he could think of, and may perhaps confess that he had thought of, but rejected, some that were mentioned. And he must confess that if he wishes to maintain his judgment, he must give reasons which are (at least) sufficient in his eyes for his choice of *S is P*. It is clear, therefore, that any actual judgment is by origin 'subjective' in two ways—(1) because it is the product of a human selection, and (2) because it is the

[1] It is not intended to deny that there may be real alternatives in nature, if there are realities which are really (more or less) indeterminate in their action. In the case of human action, for example, there is good reason for suspecting a measure of real indetermination. But our logical treatment of this possibility is characteristic. We always assume that for the purposes of calculation the event is really determined and that if we knew more we could predict it. *I.e.* we take the alternatives as *subjective* (cf. *Studies in Humanism*, chap. xviii).

selection of an individual whose choice may or may not win the approval of others. We return, therefore, to the conclusion which has already confronted Formal Logic more than once (Chap. VII, § 8 *n.*), that if dependence on human personality is really consistently excluded from the 'logical' judgment, all judgment will be rendered impossible. For after all *judging* has been declared extra-logical, what can 'the judgment' be but an inexplicable form of words?

§ 9. *The Ambiguities of Modality*

Even when modal judgments have been (for logical purposes) restricted to the three forms *must be* (or cannot be), *may be*, and *is*, they remain full of ambiguities and confusions.

(*a*) How, for example, is an 'assertoric' judgment to be distinguished from a 'categorical' by the resources, and in accordance with the principles, of Formal Logic? Both are in the form *S is P*, and the difference, if any, must be in their meaning. Logicians accordingly have suggested that the assertoric '*is*' differs by being a *reaffirmation* against a doubt,[1] while the categorical '*is*' just asserts existence. But there is nothing to show when we have the one sort of judgment and when the other. There is no difference in the *form* of expression, which in consequence becomes ambiguous. *I.e.* the 'judgment' *S is P* is really a 'proposition.' Its meaning may be 'categorical' or 'assertoric.' The distinction lies in a difference of the reference. If *we mean* by 'S is P' to exclude a hypothesis or a disjunction, it is 'categorical'; if to exclude a possibility or a necessity, it is 'assertoric.' But how is any one else to know *which* we mean? Must he not know our intention and state of mind? And is

[1] This doctrine does not seem to be true in fact. When an assertion is doubted, stronger measures than mere reaffirmation are needed, and usually employed. The assertion at once develops modality under the challenge. *E.g.* 'I saw Smith yesterday.'—'But I thought he had left last week.'—'Well, I *may* have been mistaken, but I think it *must* have been Smith, because . . .' Note that though the modal forms are intended to support the original assertion, they do not necessarily imply any great confidence in it.

he not forbidden to ask because such knowledge belongs to 'psychology' and not to Formal Logic? The distinction, then, is plainly psychological and not Formal.

(*b*) Into the problematic and apodictic 'judgments' the modality introduces 'ambiguity' for two reasons—(1) because it is not able to discriminate between the very different meanings and different degrees of possibility and necessity, and (2) because the possibility and necessity meant may be either subjective or objective (§ 10), and the form does not discriminate between them.

(1) When a dogmatist says 'You may be right,' his real judgment does not differ (except in politeness) from 'You are wrong.' On the other hand, the phrase may also express what is really felt to be an open question. 'It must be so,' similarly, will serve to convey any degree of assurance, from the most absolute conviction of which the most dogmatic mind is capable to the most dubious inference of a tentative train of thought. As a rule, indeed, the apodictic form does not express any greater confidence than the assertoric, and not infrequently it means less. For all it need mean is that grounds have been demanded for an assertion and that an attempt is made to supply them. Hence it implies that in fact the assertion has been doubted, and therefore is presumably doubtful. The assertoric form may mean that it has never occurred to any one to doubt it, but that it is generally accepted as a 'self-evident' and uncontested truth. Nor, on the other hand, is its assertoric form any reason why any judgment should get conceited. For though it may show that in fact it has *not yet* been disputed, a doubt may arise at any moment. Sooner or later that day comes for even the most 'self-evident' and self-confident assertions. And then they have to give reasons for the truth they claim, and become dependent on them. Instead of merely saying 'It is so,' they have to say 'It must be so, because . . . ,' and they may thereby gain in security more than they lose in self-assertion.

Nor is there necessarily much difference in actual meaning between the problematic and the apodictic

forms. Some prefer to use the one, others the other. That is a matter of personal taste and temper. But the subjects they argue about are in point of fact always doubtful. Else there would be nothing to provoke inquiry and to get up an argument about. In itself, therefore, the problematic form would seem to be most appropriate to the perplexities of human knowing. But the use of the apodictic form need not be condemned; it most often seems to be merely a form of inference. At any rate it can hardly be contended that it adds anything to the force of a conclusion to say 'Therefore S must be P' rather than 'Therefore S is P.' Even where the apodictic form aims at something loftier, and is intended to express an immediate self-evidence, or confidence in the grounds of the judgment, or what is oddly called an 'immediate necessity,'[1] the logical situation is unaltered. For not only is Formal Logic quite unable to discover the *intention* of a proposition, but neither the 'immediacy,' nor the 'self-evidence,' nor the feeling of 'necessity,' nor any amount of confidence which the proposition evokes, can exempt it from a critical examination of its grounds. But once reasons of any kind are given for an assertion it becomes logically a dependent, and the necessity claimed for it can be nothing else than the necessity of inference.

§ 10. *The Subjectivity of Modality*

(2) The doubt as to whether a modal proposition is meant to affirm an objective or a subjective possibility

[1] The phrase is really a *contradictio in adjecto*; for 'necessity' affirms, and 'immediacy' denies, dependence on grounds. Moreover, it is not difficult to show that the examples given of such necessity are illusory. *E.g.* that 'a line must be either straight or curved' depends on the definition of straight line. It follows from the Euclidean definition; but the 'straight' lines of non-Euclidean geometries may be also curves, and the 'straight lines' of physical space always are curved, *e.g.* the base line in a geodetic triangulation. Lastly, the logicians who believe in 'immediate necessity' refute their own doctrine by teaching also the incompatible theory that truth is a systematic whole in which every part is dependent on every other. It follows from this that no *partial* 'truth' can be true as stated, simply because it does not state the whole truth, and that 'immediate necessity' cannot be a guarantee of truth. Indeed, it is a complete guarantee of falsity. For it means (a claim) that the judgment is true irrespective of the Whole Truth, which contradicts this theory of truth. Thus, even '$2+2=4$' becomes false, *just because* it claims to be absolutely and independently true on its own account.

or necessity not only renders it ambiguous and refutes its claim to be a judgment, but also raises several important philosophic questions.

Originally it was thought (by Plato and Aristotle) that the logical nature of a judgment depended on the ontological nature of the object judged about. Aristotle also believed that there were objects inherently '*contingent*,' *i.e.* capable of being or not-being, and '*necessary*,' *i.e.* 'incapable of being otherwise' and immutable. Consequently our judgments about these objects followed suit, at least in so far as we had true 'knowledge' of them and were not merely 'opining.'[1] Necessary judgments, therefore, were simply judgments about 'necessary beings' (God, the stars, and mathematics); possible judgments, judgments about contingent beings (everything sublunary); impossible judgments, judgments about impossibilities.

According to the subjective view, on the other hand, possibility and necessity resided wholly in the mind, and consisted in a different attitude towards the simple 'assertoric' or 'pure' proposition, 'S is P.' Viewed not as expressive of a 'fact,' but as something which might become true, this becomes 'S may be P'; viewed as an inference, it becomes 'S must be P.' Thus both the uncertainty which renders the proposition problematic and the certainty which renders it necessary are alike subjective, and neither of them inheres in reality as such, which is neither contingent nor necessary, but just *is*. Modality, therefore, is essentially a transformation of 'fact' for the purposes of human knowing.

Of these two views it soon became clear that the latter was the less inadequate. The former was manifestly too simple. Many problematic judgments, at all events, did not mean to affirm any real contingency at all. 'King Mena may have lived about 5000 B.C., or, again, about 3000 B.C.,' does not mean that his vital elasticity was

[1] The possibility of error in judgments about 'necessary matter' (though admitted by Plato in the *Theaetetus*, 196) was hardly investigated at all, and explained as little as the possibility of error elsewhere. To this day some logicians write as if errors in mathematics were logically impossible and the form of mathematical reasoning guaranteed infallibility.

capable of spreading his life alternatively over two thousand years. It means that our uncertainty about early Egyptian chronology is such that we have to allow so wide a range for the actual date of Mena. Clearly, then, a subjective contingency, based on human ignorance, must be admitted alongside of the objective contingency attributed to the inferiority of the 'matter' in the sublunary parts of the Aristotelian cosmos. Indeed, with the rise of determinism, it became inconceivable to many philosophers that there should be such a thing as real contingency at all. *All* events were necessary, and if we could only know them better, we should see this too. Contingency and possibility, therefore, did not really exist; they were illusions due to our imperfect vision, and the differences between them were illusory too. This, again, was a metaphysical doctrine, inspiring, no doubt, to those who relished it, but hardly in accord with the logical facts. For what was determinism to do with judgments expressive of an indetermination? For an indeterminist, at any rate, 'He may marry her' and 'He may have married her' do not mean the same thing; by the first he may mean to express a real contingency, and by the second his real ignorance. And though he may be metaphysically wrong, yet the logical difficulty remains. What did his judgments mean, and what did the difference between them mean? Apparently, then, there is no avoiding the recognition of both objective and subjective possibilities.

On the other hand, there is no serious objection to conceiving all 'necessity' as 'subjective,' *i.e.* as a human addition to the 'facts.' Indeed, the difficulty is rather in attaching any intelligible meaning to the notion of 'necessary being.' For how can a fact be more than fact or less than fact, and how can our certainties or doubts affect its being? To bestow any sense upon the phrase 'necessary being,' the notions both of 'fact' and of necessity would have to be radically reformed.

Once, however, it is admitted that necessity and possibility may depend on human attitudes towards reality, it follows that they do *not* belong to a Formal Logic which

systematically excludes such attitudes. The fact that both are attitudes accounts for the affinity between them, while the fact that they are Formally extra-logical may explain why Formal Logic has somewhat neglected them.

§ 11. *Synthetic and Analytic Judgments*

This classification of judgments was thought by Kant to be of enormous philosophic importance, but deserves a mention, because it illustrates so well the illogicalities of Formal Logic.

Kant called a judgment *analytic*, when the predicate only explicates the meaning of the subject, and is really contained in it; *synthetic*, when it adds to its meaning something not known to belong to it. Thus, according to Kant, 'bodies are extended' is analytic, because the meaning of 'body' is precisely 'extended substance,' and the judgment is only an analysis of the conception of body. 'Bodies are heavy,' on the other hand, is synthetic, because gravitation is not part of the definition of body.

Now this distinction is in various ways objectionable, and quite worthless for the analysis of actual thinking.

(1) It reduces 'analytic' judgments to tautologies and rests on a false conception of logical identity (Chap. X, §§ 5, 10).

(2) It renders it arbitrary what judgments are analytic, just in so far as we perceive that there are alternatives of definition. It depends on the definition chosen whether it shall be 'analytic' or 'synthetic' to say that bodies are extended, and in point of fact gravitation is a better criterion of materiality than extension.

(3) It renders 'analytic' or 'synthetic' relative to the state of one's knowledge. The same judgment may be synthetic to A and analytic to B, simply because he knows more. It follows that it defies the principle of Contradiction, because it is at the same time analytic and not analytic. And if the contradiction is avoided by the plea, 'Yes, but not for the same persons,' it becomes clear

that the reference of a judgment's meaning to the persons who made it has been conceded (cf. Chap. X, § 6).

(4) The existence of analytic judgments is rendered quite unintelligible. For if they are tautologies and convey no novelty, why should any one trouble to enunciate them? Surely the maker of every judgment must feel it to be synthetic for himself or instructive to those who listen to it, else what conceivable reason can there be for making it?

For example, when George IV asked who was the author of *Waverley* and was told 'Scott is the author of *Waverley*,' the answer was synthetic to him, and modified *both* its terms in an enlightening way. If, however, he had known this 'identity,' he would not have asked, neither would those who knew have asserted it, unless he had asked, *because* he did not know (or felt doubtful). The judgment, therefore, could not have come into being without the conjunction of *two* parties, of which the one knows the identity of 'Scott' and 'the author of *Waverley*,' and the other does not. Formal Logic, by disregarding as extra-logical the relation of the judgment to this personal context, renders it ambiguous, and then proceeds to puzzle itself with meaningless questions, whether the judgment, *per se* and in the abstract, is (not *was*!) 'synthetic' or 'analytic,' and whether, because Scott was in fact the author of *Waverley*, what the king wanted to know was whether Scott was Scott.

After this, one might expect Formal Logic to condemn the distinction between 'analytic' and 'synthetic' as 'psychological' and wholly useless. Far from it. Because it is a bad distinction, it feels prompted to make it worse. It explains elaborately that every judgment is *both* synthetic *and* analytic, but forgets to mention that it cannot be this at the same time and to the same persons. Nor does it explain that, in order to show this, it must use both terms in a different sense from Kant's, and no longer discusses Kant's question, whether some judgments instruct and others do not. Nor does it explain that in actual use it must be intended *either* to analyse a given whole

or to put one together out of given parts, and that not the form, but only the actual use can reveal what its real meaning is.

We have seen, therefore, that throughout its discussion of the 'forms of judgment,' Formal Logic has exhibited a deplorable incapacity either to penetrate beyond the verbal form or to hold fast consistently to its own abstractions. We shall see in the next chapter how much better it can do in dealing with the forms of propositions.

CHAPTER XII

THE DISTRIBUTION OF TERMS AND OPPOSITION OF PROPOSITIONS

§ 1. *The Propositions A, E, I, and O*

It is customary in Formal Logic to divide Propositions (we have seen in the last chapter that it is impossible to classify the real judgments) on the basis of Quantity and Quality together. This procedure yields *four* forms, viz. the *Universal Affirmative*, the *Universal Negative*, the *Particular Affirmative*, and the *Particular Negative*. For the singular judgment no special provision is made, because it may be treated as universal, according to the doctrine of the Distribution of Terms (§ 2). These four forms are then symbolized by the vowels A, E, I, O, taken from *AffIrmo* and n*EgO*. As examples we may give:

(1) Of A, 'All units are equal.'
(2) Of E, 'No women are voters.'
(3) Of I, 'Some men are honest.'
(4) Of O, 'Some men are not honest.'

There are certain conventions as to the meanings of terms. Thus (*a*) 'some' is taken as 'some at least,' and not as 'some, not all.' *I.e.* it does not exclude 'all,' but for logical purposes may include it. (*b*) It is assumed that all judgments may be given a meaning in extension (cf. Chap. III, § 1, Chap. IX, § 3). This is denied by some logicians, who rightly enough point out that many judgments are not *meant* in extension. But as it is always possible to interpret the *words* of any judgment in extension and, as they themselves have disclaimed the

systematic exploration of actual meaning, their protest must be disallowed. Formal Logic, therefore, can undertake to analyse all judgments by reducing them to these forms. It proceeds to discuss the *Distribution of the Terms* in these propositions.

§ 2. *The Distribution of Terms*

A term is said to be *distributed* when the assertion refers to the *whole* of it, *undistributed* when it refers only to *part* of the term. Thus 'all' and 'none' mark the distribution of the subject, 'some' and 'some not,' or their equivalents, its non-distribution. It is assumed that the quantity of the subject may always be demanded, but not that of the predicate (cf. Chap. XI, § 3), and that indefinite judgments may be ignored. This is more or less in accord with language which does not state the quantity of the predicate, even when it is thought of as quantified (*e.g.* 'Some clergymen were the minority'), and often quantifies the subject.

Applying this distinction to the four forms, it appears:

(1) That an A proposition distributes its subject, but not its predicate. 'All men are mortals' asserts nothing about *all* mortals, but must be taken to mean that they are *some* mortals.

(2) That an I proposition leaves both its terms undistributed; 'Some socialists are eugenists' does not assert that they are *all* the eugenists.

(3) That an E proposition, expressing the *total* separation of its subject from its predicate, distributes both.

(4) That an O proposition distributes its predicate but not its subject. For it excludes the predicate from the part of the subject judged about; 'Some socialists are not eugenists' denies that these particular socialists are to be found anywhere among the eugenists.

Or, more concisely, it may be laid down that *universal propositions distribute their subjects, negative their predicates*, while *particular propositions do not distribute their subjects.*

The *singular* proposition ranks as distributed. For any assertion made about its subject must necessarily refer to the whole of it, as it is only one. This ranking of the individual with the universal (class) is not very consistent, perhaps, with the usual Formal estimate of their merits, but may pass.

§ 3. *The 'Ambiguity' of the Forms*

The trouble begins when we inquire how these four forms of proposition are related to the meanings they may be used to convey. For it then appears that there are *five* possibilities. (1) The whole of the predicate may be predicable of the whole of the subject, so that subject and predicate are coextensive; *e.g.* 'Washington is the capital of the United States,' or 'Equilateral triangles are equiangular.' (2) Part of the predicate may be predicable of the whole subject, so that the extension of the predicate is the greater; *e.g.* 'All men are mortal.' (3) The whole of the predicate may be predicable of part of the subject, or (3*a*) may be denied of it; *e.g.* 'Some animals are men,' or 'Some animals are not men.' (4) Part of the predicate may be predicable of part of the subject, and (4*a*) part not; *e.g.* 'Some cats are male,' and 'Some cats are not male.' (5) No part of the predicate may be predicable of any part of the subject; *e.g.* 'No triangles are one-sided.'

On symbolizing these relations by the diagrams called Euler's circles, they may be made evident to the eye.

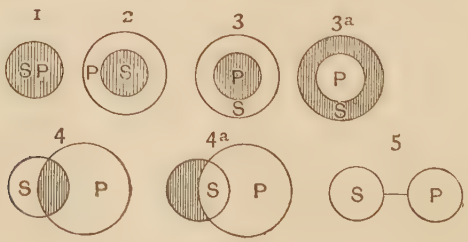


Fig. 1.

Clearly the forms A, I, O will express more than one of

these relations. The universal affirmative, A, 'all S is P,' will apply both to No. 1 and No. 2 ; the particular affirmative, I, 'some S is P,' to Nos. 3 and 4, and in virtue of the convention that 'some' may include 'all,' also to Nos. 1 and 2. The particular negative, O, 'some S is not P,' will be true of Nos. 3*a* and 4*a*, and in virtue of the convention about 'some,' also of No. 5. Lastly, the universal negative, E, 'no S is P,' will be the only form which applies only to one relation, viz. No. 5.

Clearly, therefore, all the forms except E are capable of plurality of senses, and the form in itself is no clue to the actual meaning-in-use. This leads Formal Logic to enact the further convention that, to be on the safe side, an A proposition shall always be interpreted as a case of No. 2, and that No. 1, in which the predicate also is 'distributed,' though it occurs frequently and is, *e.g.*, the meaning of definitions, shall be ignored as much as possible.

Secondly, it is obvious that all the possible meanings may be exhaustively covered by the two pairs, A (1 and 2) and O (3*a*, 4*a*, 5), and I (1, 2, 3, 4) and E (5), and this is the fact on which the doctrine of the Opposition of Propositions rests.

At the same time it is no wonder that the 'ambiguity' of its forms should have led Formal Logic to attempt to determine the actual meaning more precisely.

§ 4. *The Quantification of the Predicate*

The device which suggested itself for this purpose is known as the *Quantification of the Predicate.* It doubles the number of available forms, but it may easily be seen that this is no remedy. For they now err by excess instead of by defect, and some of them remain more 'ambiguous' than ever. Besides this, we now have some utterly fictitious forms to cope with. We get the following forms :—

(1) All S is all P = U
(2) All S is some P = A

(3) Some S is all P = Y
(4) Some S is some P = I
(5) All S is no P = E
(6) All S is not some P = η
(7) Some S is no P = O
(8) Some S is not some P = ω

Here the convention that 'some' may include 'all' is given up, and the new propositions are symbolized by U, Y, η and ω. They are next distributed over the possible relations of S and P. At first all goes well. U applies only to Fig. 1, A only to Fig. 2, Y only to Fig. 3, I only to Fig. 4, E only to Fig. 5. But then it turns out that η, O, and ω remain obstinately 'ambiguous.'

Fig. 2.[1]

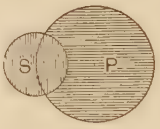


Fig. 4.

Fig. 5.

Fig. 3.

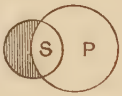


Fig. 4.

Fig. 5.[2]

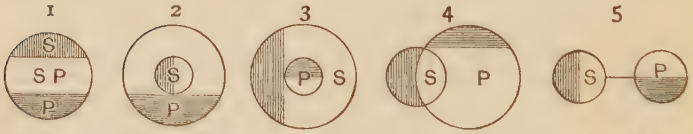


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.[3]

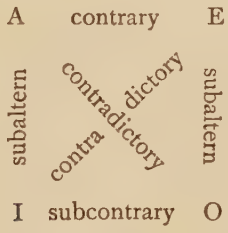
'All S is not some P' applies to Figs. 2, 4, and 5. 'Some S is no P' remains true of Figs. 3, 4, and 5, while, lastly, 'some S is not some P' is compatible with every relation, not excepting that of U (No. 1).[4]

[1] This retains, however, the conventional use of 'some.'
[2] Same sense of 'some.'
[3] *I.e.* if 'some' excludes 'all,' this form is meaningless, because it cannot denote any of the actual relations.
[4] Unless both S and P are singular terms.

There could hardly be a better object-lesson of the futility of first abstracting from the actual meanings and then trying to discover them *a priori* by analysing verbal 'forms.' Possibly after this Formal Logic may become a little less severe in rejecting 'psychological' protests against the Quantification of the Predicate on the ground that people do not usually think of the quantity of their predicates and therefore could not truthfully say what they meant it to be.

§ 5. *The Opposition of Propositions*

Being thus thrown back on its 'ambiguous' forms A, E, I, O, Formal Logic proceeds to investigate their interrelations, when they are severally asserted about the same terms. It begins by giving names. A and E it calls *Contraries*, as being furthest apart under the same genus. A and O are *Contradictories*, as also are E and I. I and O are *Subcontraries*, A and I, and E and O are *Subalterns*. The whole may be put diagrammatically in the 'square of oppositions.'



We are further told that *contraries* cannot both be true and may both be false, *e.g.* 'All men are honest,' 'No men are honest.' Of two *contradictories* one must be true and the other false. The *subcontraries* may both be true together, *e.g.* 'some men are honest;' 'some men are not honest.' Of *subalterns* the truth of the universal includes that of the particular, but that of the particular leaves that of the universal 'doubtful.' We are thus told that we may argue—

If A be true, that E and O are false and I is true.
If E be true, that A and I are false and O is true.
If I be true, that E is false, and A and O are doubtful.
If O be true that A is false, and E and I are doubtful.
If A be false, that O is true and E and I are doubtful.
If E be false that I is true and A and O are doubtful.
If I be false that E and O are true and A is false.
If O be false that A and I are true and E is false.

Curiously enough, this doctrine is mostly correct and has some value for the guidance of actual thought. The distinction between contraries and contradictories, for example, is important, because most men are apt to confuse them, and to commit the inelegance and superfluity of trying to refute a false universal by the opposed universal (which may be false also) instead of merely adducing a single contradictory instance. It is also well to have impressed on us how very precarious are universal propositions, though Formal Logic does not proceed to remark that in practice our bias in their favour is so strong that they hardly ever succumb, as they logically should, to a single contradiction. How many ghost stories and miracles would have to be authenticated to upset the cherished beliefs that the dead do not return and that miracles are not possible?

But the rightness of these oppositions does not depend on the 'square' or the technicalities, but on the real relations of subject and predicate which we depicted in § 3. Thus one of the contradictories must be true, because between them they exhaust all the possibilities. But the impotence of formal analysis comes out again in the assertion that some of these inferences are 'doubtful.' This is strictly nonsense. Because, if, *e.g.*, I is true, it is true because the actual situation is one of those depicted in Figs. 1-4. Now the first two of these are called A and the second two O. Either A or O are true, therefore. But in any actual case the truth is definitely one of them and therefore A *or* O, and there need be no doubt about it. It is doubtful only in the abstract, when we have merely an empty form before us,

and do not know which of its four possible meanings it will be used to convey, and consequently cannot say what the real facts are. Thus the Formal analysis confuses a doubt about the form with a doubt in the real judgment.

CHAPTER XIII

CONVERSION AND OTHER FORMS OF IMMEDIATE INFERENCE

§ 1. *Immediate Inference*

THE Opposition of Propositions is the first example of what Formal Logic calls *Immediate Inference* and conceives as differing specifically from mediate or syllogistic inference. Whether this is an appropriate description we may forbear to discuss until we consider Inference in general (Chap. XIV). Many logicians seem to doubt whether what is called immediate is not rather a verbal manipulation of terms, or again whether as inference it can really be immediate. However this may be, we shall do well to realize from the outset how very artificial and arbitrary is the whole procedure. There appears to be no need, and very little reason, for any of it. Why should one be compelled to infer from 'all S is P' that therefore 'some P is S'? Why should one not, even on Formal principles, infer 'no S is not P'? Surely no one infers except with a view to some purpose, and neither this nor any other inference will be drawn, unless this purpose requires it. The only purpose, however, which Formal Logic appears to consider humanity capable of rationally entertaining is that of tracing out all the complicated consequences of its mistaken abstractions. Of course it does not openly say so. It talks about truths formally involved in other truths. But, as we have abundantly seen, it has no right to speak of truth until it has discovered and secured a meaning. And this,

unfortunately, is just what hitherto its forms have been unable to do. They remained 'ambiguous,' and gave no clue to the real meaning of those who used them. Nor is it possible to see how in any case the peculiar purpose of the Formal doctrine of Immediate Inference, whether avowed or unavowed, renders it less dependent on purpose; it only seems to render it dependent on a peculiarly trivial purpose. We shall accordingly find that the whole Formal doctrine of Immediate Inference is on the same level of thought and open to the same criticism. But the procedures known as *Conversion*, *Permutation*, and *Contraposition* may briefly be considered.

§ 2. *Conversion*

Conversion at first sight appears to be prompted merely by a morbid desire to change the order of the subject and the predicate in the form of propositions. This, however, is not its real motive, which turns out later to be to facilitate the logical game called the 'reduction' of syllogisms. But even so the process seems trivial enough.

The proposition to be subjected to this manipulation is called the *Convertend*, that which emerges from it the *Converse*, and the rule of the game is that *no term must be distributed in the converse which was not distributed in the convertend.* The reason given is that we must not (in order to be formally correct) assume any fresh knowledge beyond that implied in the strictest verbal construction of the original proposition, nor, consequently, make assertions about the whole of a term when we only have information about part.

After that operations on the forms A, E, I, and O may begin.

(1) 'A' will not convert into 'A.' We cannot infer from 'all S is P' that 'all P is S,' because affirmative propositions do not distribute their predicates (Chap. XII, § 2). *I.e.* we had no right to assume *from the verbal form* that it was of type I (Chap. XII, § 3). So it is conventionally

taken to be of type II, and can only be converted into '*some* P is S.' This arbitrary and artificial limitation, which is unscientific because it fails to express what is often admittedly the actual meaning, is called *Conversion by limitation*, or *per accidens*. Hence the Conversion of A necessarily degrades it into I, and if it is then again converted, we get '*some* S is P' as the inference from '*all* S is P.' This, however, is counted as a great triumph; for is not the truth of its subaltern 'I' included in that of the universal 'A'?

(2) 'I' gives no trouble at all to the converter. It converts *simply*, and as often as he pleases. He can say, 'some S is P' or 'some P is S' indifferently.

(3) 'E' too is capable of *Simple Conversion*. It matters not whether we say 'no S is P, or 'no P is S.' The truth is that neither E nor I afford any temptation to break the rule about the distribution of terms, because in E both, and in I neither, of the convertend's terms were 'distributed.'

(4) 'O' is refractory. For in 'some S is not P,' as the quality is negative, and negative propositions distribute their predicates, it is impossible to convert it without putting its undistributed subject in a position where it must be distributed. The form of negation demands that we shall assert about the whole of the predicate, and in this case we have knowledge only about part. Hence the rule about the distribution of terms cannot be observed, and the Conversion of O is impossible.

§ 3. *Permutation, Conversion by Negation, and Contraposition*

But it would be seriously to underrate the resourcefulness of Formal Logic to suppose that this obstacle could daunt it. After some centuries of hesitation and profound reflection, it simply invented a new process called *Permutation* or *Obversion*, which changes the *quality* of propositions.

Instead of 'some S is not P,' let us simply say

'some S is not-P.' We have a perfect right to do this, because 'P' and 'not-P' are contradictory terms, and all the world must (thanks to the glorious Law of Excluded Middle) be either P or not-P, however humble or fatuous a predicate P may intrinsically be. Hence by denying that S is P we *ipso facto* assert it is not-P. After that, who can doubt that the original O, now conveniently permuted into an I, can be converted 'simply' into 'some not-P is S'?

Having achieved this conversion and reduced O to subjection, Formal Logic, it is fair to say, does not lay much stress on the permuting of the rest,[1] though it just mentions that permutation and conversion is technically named *Conversion by Negation*, and that I is recalcitrant to this manipulation because the initial permutation has turned it into an O.

Conversion by Contraposition, on the other hand, has some importance attributed to it, because it is regarded as a device for avoiding the loss of universality inevitable in the Formal conversion of A. It consists of permuting, converting, and permuting again. *E.g.* 'all S is P' becomes 'no S is not-P,' then 'no not-P is S,' and finally 'all not-P is not-S,' which is formally A.

§ 4. *Criticism*

Hardly any logician of repute will nowadays contend that these formal manipulations of symbols represent actual thinking, and so our criticism may be brief.

It should suffice to point out (1) that Conversion cannot express any actual meaning of a judgment wherever the predicate is not thought in extension. For it then at once becomes impossible to say what its 'quantity' is to be in the converse. The truth is that it has none.

(2) Conversion fails lamentably to express the full meaning of many A propositions, and the device which was intended to meet this difficulty and to render all

[1] It mercifully abstains, *e.g.*, from permuting I into 'some S is not not-P' and then converting this into 'some not-(not-P) is S.'

conversions 'simple,' viz. the 'Quantification of the Predicate,' proved to be futile (Chap. XII, § 4).

(3) Permutation sins against actual thinking by obliterating the fundamental difference of attitude between affirmation and negation, and representing a denial of A as an affirmation of not-A. This is (in general) psychologically intolerable.

(4) It also employs the Formal fiction of the 'infinite' negative term 'not-A,' which is not an actual meaning (Chaps. X, § 11, II, § 10).

The 'second part' of Formal Logic then concludes with a repetition of the old failure to represent actual thinking and to determine actual meaning. It also leaves on our hands the forms of 'Immediate Inference' as a problem. We have still to decide how far they represent any actual process of immediate inference there may be. But we cannot do so until we have examined the general nature of Inference.

CHAPTER XIV

THE GENERAL NATURE OF INFERENCE

§ 1. *The Problem of Inference*

WITH Inference the 'third part' of Formal Logic admittedly begins, although it is clear that in the conception of 'immediate inference' the barrier between Judgment and Inference has worn pretty thin. It is indeed a wholly artificial line which cuts across the natural continuity of thought. For no actual judgment ever leads an isolated life. It is born of parents, and is intended to have offspring. *I.e.* it is essentially inferential. We judge in order to conclude, or to start, a train of thought.

All this is obvious, both to common-sense and to a logic which has not tried to cut off relations with psychology. But Formal Logic has real difficulty in formulating its conception of Inference. This difficulty is partly due to the general impracticability of its fundamental abstractions, and partly also to its obsession with the importance of the Syllogism, which it cannot help regarding as its own culmination and as an absolutely certain form of 'valid thought.' Both these prejudices prevent it from grasping, and indeed from even examining, the nature of inference as a general problem.

Now, both etymologically and psychologically we must regard as inference *any* process of thought by which a mind passes from one judgment to another, and the general question about Inference concerns the ways, means, and motives with which *any* train of thought proceeds

The slightest study of this problem at once reveals that the process of inference is exceedingly complex, and that in every concrete case of actual thinking *the whole of a man's personality* enters into it and colours it in every part. It is also obvious that the *value* of the results differs enormously in different inferences, and that however we conceive and judge 'value,' some inferences are very much *better* than others.

The Formal logician to some extent recognizes both these facts. (1) He sees that if his science is not to be carried away by floods of psychology, he must *artificially simplify* his problem. He tries, therefore, to win exemption from what seems to him the hopeless, or at all events repugnant, task of observing and evaluating the actual processes of thought, by framing the conception of *valid inference*, which alone is to be a concern of logic. By this means he thinks he can dismiss the bulk of actual thoughts.

(2) He tries to associate this conception with the judgments of value he is naturally prompted to pass on the actual inferences of men. He condemns most of them as 'bad.' Others he regards as 'doubtful,' as possibly right, in fact, but as uninteresting because dependent on 'material' knowledge, and few indeed will be the inferences he can regard as 'good,' because they are 'valid' and 'necessary.' For *he conceives 'validity' as a matter of Form.* He is haunted by an ideal of 'valid inference' which alone is 'logical inference,' in which every step forward is absolutely necessitated by what has gone before. Still he does not despair. He believes himself to have found such Formally 'valid inferences' in (at least) two cases, in the 'immediate inferences' we have already considered, and in the Syllogism.

§ 2. *The Notion of 'Valid Inference'*

However fervently a logician may believe in 'valid inference,' he cannot but recognize that the conception involves certain difficulties. There are three essential

qualities which it is desirable, and indeed necessary, that a valid inference should have; but it is not altogether easy to show either how it has them or how it combines them.

(1) A valid inference should be *necessary*. It should exclude every form of arbitrariness or interference with the rational self-development of thought; it should follow inevitably from its grounds.

(2) Nevertheless it should also possess *novelty*. It should not merely reaffirm what is already known; to do so is not to infer, even for Formal Logic. A valid inference, therefore, should carry thought on to something new. It is essential to inference that there should be some difference, and advance, of meaning between the truth inferred and its grounds.

For (3) only thus has the act of inference as such a meaning. And a valid inference must be *significant*—significant, moreover, *as a form*. Were it merely to re-assert the same meaning, it would have no meaning. Were its meaning to be essentially dependent on the actual circumstances under which it was drawn, it would have no meaning a self-respecting Formal Logic could descend to, and so be worse than meaningless. Nor, again, would it have a meaning, if it merely promulgated forms which were said to be absolutely valid, but in which no actual meaning could be conveyed, or which failed to guarantee our actual meanings when we tried to express them by their aid.

This last *desideratum* has not yet been clearly perceived by Formal Logic, but it could hardly be denied. The other two have been familiar enough from the first. They constitute '*the paradox of Inference*,' and the difficulty of reconciling them is notorious. For if the judgment inferred is to be inevitable and wholly dependent on its Formal grounds, how can it do anything more than render explicit what is already known? Whence can any real novelty intrude into the Formal scheme, and how can it be conveyed? If we already understand that S and P are not connected, how can it add to our knowledge to 'infer' from 'no S is P' that 'no P is S'? Is not the

change merely verbal? Or if we know that 'the ship went down with all on board,' and also that 'Smith was on board,' what advance in thought is the 'inference' that 'Smith went down'?

We need not discuss this 'paradox' until we have considered these elements in the notion of 'valid inference' in their order, but we should prepare ourselves to recognize it as a still greater 'paradox' if the form of 'valid inference' should turn out to be as such unmeaning.

§ 3. *The 'Necessity' of Inference*

What does this mean? Logicians usually consider it too obvious (or too psychological) a question to consider, and the answer is consequently difficult.

(1) It can hardly mean that inferences are accompanied by a *feeling of necessity* in their makers. This is often a fact, and is always liable to become a fact when an inference, made easily and without consciousness of 'necessity,' is challenged, and reasserted as dependent upon grounds. But this interpretation will not do in Formal Logic. For such a feeling would plainly be nothing but a psychical fact about the state of mind of those who inferred, and as such would be relegated to psychology.

(2) Can the 'necessity' then mean that, no matter how its maker feels about the inference, there is not in fact any alternative but to draw it? Does it mean *inevitableness* and the absence of a choice? This yields a good 'logical' meaning, and one more consonant with the prepossessions of Formal Logic. But a question may be raised whether it is true, and whether, in fact, such necessity ever occurs in actual thought.

It may be objected (*a*) that it is never necessary to infer, simply because it is not necessary to think (Chap. X, § 7). Nor can we ever be *compelled* to go on thinking[1]; we can stop at any point. No necessity

[1] Except, of course, in morbid cases in which the normal mechanism of inhibition is deranged; but it will hardly be contended that such thinking is typically 'logical' or productive of valuable results.

of thought, therefore, can be generated without a *will to infer*.

(*b*) A will to infer, even if it is granted, still leaves us free to infer in every conceivable direction. It does not tie us down to the 'valid inferences' which are Formally 'necessary.' It leaves us a *choice* between a vast number of inferences, all of which are Formally arbitrary. Having judged 'the day is fine,' shall I infer 'I will go out,' or 'what a pity I have to work,' or 'I hope it will be fine to-morrow,' or 'I hate picnics,' or 'so it is untrue that there are no fine days in Scotland,' or anything else that might be suggested to my mind or another? *Which* of these inferences it is rational for me to draw, and which I shall actually draw, depends on my character and circumstances, my interests and purposes. But I shall get no light upon the subject from Formal Logic. For of all these things it disclaims all knowledge. How, then, can it judge whether my actual inference is 'good' or 'bad,' rational or fatuous, 'necessary' or arbitrary and gratuitous?

(*c*) It cannot even tell me which of the Formally necessary inferences, which alone it deigns to notice, I am to be compelled to draw. For I appear to have a choice even among the specifically 'logical' inferences. Why, *e.g.*, should I say, 'Among fine things is this day,' rather than 'Therefore the day is not not-fine'? The one inference is compulsory only if my sole mission in life is the conversion of propositions, the other, if it is their permutation. Even in the strictest formal necessity there is still a choice; I need not have converted my judgment, but might have permuted it, or used it in various ways as a syllogistic premiss.

(*d*) Clearly, therefore, the term 'necessity' is either ambiguous, and means 'compulsion' in one part of the Formal argument and 'inferential nature' in the other (in which case the argument reduces to 'all inference is inferential'!), or it is always conditional and dependent on the purpose which animates the thought. But of this essential reference to purpose in all reasoning we do not

hear a word in Formal Logic, though its own account of Formal inferences clearly implies purposes of a very special kind.

(*e*) If even Formally there are alternatives to any judgment, it is clear that no Formal explanation of the inference actually drawn can ever be sufficient. The real ground of Inference can never be Formal, even in cases when from 'All men are mortal' it is inferred that 'Smith[1] is mortal,' rather than 'Some mortals are men.' And the existence of this unstated and unknown ground of Inference disposes of the contention that any judgment can be shown to be Formally *necessary*. There can be no such thing as Formal Inference, because there are always alternatives (whether Formal or not) logically conceivable, from among which the actual judgment is *selected*. The principle of this selection is always of a psychological sort, and lies beyond the purview of formal analysis.

(3) The real meaning of what Formal Logic confusedly calls 'necessity of inference' is revealed when we inquire how it could ever get into so untenable a position without discovering its character.

The whole trouble arises out of the simple fact that Formal Logic had not made up its mind as to what it wanted to do. Was it to trace the progress of actual thinking, or to wait until that unquiet business was over and pronounce a sort of obituary notice on its defunct form? If it tried to do the former, it would have to sacrifice its dignified attitude of superiority to sordid fact, and to plunge into the endless eddies of the turbid stream of actual thinking. If it tried to do the latter, it would have to pay the price for the pleasure of serenely contemplating the spectacle of thought's activity. It would have to avow itself a mere spectator, a mere critic of results which it was impotent to produce and which were regulated by alien laws unknown to it. It would be debarred from participating in the *advance* of thought,

[1] I have ventured to substitute this more modern name for the traditional 'Socrates.'

and even from speaking about it. For its own motion would be essentially *retrograde*; logical reflection would proceed from the conclusion to the premisses, and inquire whether the latter *were* a sufficient warrant for the former. No wonder that the choice proved difficult and the temptation to occupy both positions, and to flee from one to the other whenever either was attacked, proved irresistible.

Still, on the whole the attitude of *ex post facto* contemplation turned out to be the safer, and what the 'necessity of inference' can mean from this standpoint must now be considered. Let us therefore contemplate the 'necessity' of inference as it appears *after* the inference has been drawn, and if no question is asked as to where it was and whether it existed *before*, and while there was still a question of *what* inference should be drawn. Now, *after* the event the inference, if it was of the type called 'logical,' may, of course, appear as 'necessary'; it may be seen to have grounds, and to depend on them; if it were not *in this sense* 'necessary,' it would be irrational and indefensible. But just the same situation would have appeared if any of its rivals had in fact been preferred. Grounds could have been assigned to all of them (sufficient or insufficient, good or bad), but they would never have compelled any one to judge thus. Thus the 'necessity' of such Formally logical inference is a purely formal feature common to all conceivable inferences. It no more proves that there was any real necessity to draw any one of them than the formal truth-claim of all judgments proves that any particular judgment is true. Every actual inference was, of course, inspired by motives which led to it, and not to any alternative, and these (whether good or bad) form its real grounds. But of these Formal analysis knows, and can know, nothing. It proves nothing as to the real grounds of any actual inference, simply because it is not relevant thereto. It is merely an *ex post facto* reflection, governed by highly technical and arbitrary assumptions, on an accomplished inference; it is no reason for expecting it

antecedently, and no guidance whatsoever in predicting any course of thought or explaining its advance.

The whole Formal doctrine of the necessity of inference, then, is inapplicable *in advance* to any thinking. Indeed it is nothing but a systematic confusion of two points of view, and tries to attribute to progressive thinking the results of looking back on its completed and verbal form. From the point of view of actual thinking this attitude is utterly misleading and irrelevant. The only way of really explaining the course thought is going to take is to go into its antecedents, *i.e.* the motives, character, and circumstances of the thinker. Such an inquiry may be difficult, but it will not be irrelevant, as the Formal account of thought is doomed to be.

§ 4. *The 'Novelty' in Inference*

Here the antinomy may be sharply formulated as being that (*a*) *psychologically* there must be novelty, while (*b*) *logically* there cannot be novelty. The actual position of Formal Logic will be found to flounder about between these two alternatives in helpless inconsistency.

(*a*) No rational mind can be supposed to infer without some reason for thinking at all in the first place, and for drawing the inference drawn rather than any other, in the second place. Whatever, therefore, the inference drawn, even if it is as trivial as the Formal extraction of 'some S is P' from 'all S is P,' it must have *seemed* worth making. It must have seemed to convey a sufficient degree of novelty to its maker not to seem an idle and pointless repetition, at least at the time when he inferred. So soon as he had finished, he may have recognized that after all he had inferred 'nothing new,' because his conclusion was implicit in the premisses; but *at the time* he cannot have seen this, or he would not have judged. And even if the purpose of the judgment was to instruct others, it must have been a vehicle of novelty. For though it may have been 'nothing new' to its maker, he must have imagined that he was conveying

information to his hearers.[1] If he was mistaken about this, he is a bore; but if he were in the habit of knowingly conveying information already known to all, he would be locked up as a lunatic. For, as Eliza said to her husband, 'Who wants to be told what they know already?'[2] It is clear, then, that all actual judgments, whether they take the form of 'mediate' or 'immediate' inferences, must possess psychological novelty. For only so can they acquire logical relevance and actual existence.

(*b*) But this psychological novelty, which accompanies all actual inferences, wholly evaporates when we take to contemplating logical 'Forms' in abstraction from actual thinking. Alike whether (1) we confine 'Logic' to bare 'forms,' or (2) sublimate it to an 'ideal of knowledge,' this novelty become unthinkable.

For (1) the Form must always contain in itself the full ground for the 'inference.' It can therefore only be human stupidity which is surprised, or human ignorance which is enlightened, when the latent inference is successfully exhumed. *Ex post facto* reflection, simply because it cannot arise until the act of thought is over, can never prove anything that is not already known.

(2) The notion of an ideally complete system of knowledge renders inference a superfluity. For it means that all truth must coexist as a whole, and that nothing can be either added or subtracted. Nor, we may add, extracted from it. Any process of selection or construction, therefore, must be a *purely human* operation on this perfect system (or rather on a replica thereof in a human mind), which would be an outrage upon truth's integrity, if it were not impotent. But, fortunately, it can neither dissever what nature has bound together, nor conjoin what nature has set apart; it can make no difference to eternal truth. If, therefore, it is the function of Logic to cherish and contemplate such an ideal, no logical, but only psychological, significance can be assigned to

[1] The rationale of repetition is, of course, that it is supposed to be more impressive, or to guard against forgetfulness.

[2] B. Pain, *Eliza's Husband*, p. 24.

inference, and *a fortiori* to the novelty which attends the discovery of an eternally pre-existent truth by a human mind. Or, if the ideal is projected into the future as an end which thought may some day attain, it will have to be said that *as yet* there is inference and its psychology, but no true logic; but that anon there will be logic, and then neither psychology nor inference.

What, then, shall Formal Logic do? Of the two alternatives it is clear that it cannot choose the first. But neither can it comfortably choose the second. To render all inference and every judgment, with the exception of a single unchanging and tautologous affirmation of total reality, extra-logical, is a little extreme, and may be thought to leave too little content even for Formal Logic. The process of purification by evisceration cannot be carried beyond a certain pitch even by the most inhumanly ascetic logic—for fear of committing the happy dispatch.

So Formal Logic compromises. It is inclined to admit that immediate inferences are only verbal rearrangements, and do not add to knowledge. But it clings to the Syllogism, and is reluctant to admit that as Formally conceived it always begs the question. How precisely it conceives syllogistic reasoning to produce new truth will have to be considered in the next chapter. Meanwhile it is enough to note that Formal Logic on this point of novelty has not the courage of its convictions nor the audacity to be consistent.

§ 5. *Is 'Valid Inference' unmeaning?*

Perhaps the most difficult, and yet most fundamental, point in the theory of Inference for Formal Logic to establish is that its notion of valid inference has any meaning at all. More particularly the difficulty is to see how a 'valid inference' can either (1) be produced *in rerum natura*, or (2) become relevant to any actual problem and be trusted to validate any actual thinking.

(1) It has to be remembered that the only clue

Formal Logic has to the meaning of any judgment is just the verbal form in which it is expressed. It has on principle refused to consider the history of its making and its psychical antecedents in the mind of its maker. It has thereby debarred itself from tracing the actual concatenation of his judgments and the motives for his inferences. But how can it supply this lack of real causal connexion between the judgments that are to constitute its Formal inference? It must maintain that the mere relation of 'logical connexion' existing between two propositions in the abstract, unapprehended and undesired by any mind, suffices of itself to produce the transition from one to the other. *I.e.* it must be held that the mere logical fact, that, *e.g.*, 'all S is P' and 'some P is S,' are in the relation of 'convertend' and 'converse,' is sufficient to produce the 'conversion,' to constitute the 'inference' and to make it 'valid.' But how can it do so? And why should it produce *this* inference rather than any other which is also capable of standing in the relation of a 'valid inference' towards the first? And why should logical facts generate *valid* inferences alone? Is it not just as much of a logical fact that there is a relation between 'all S is P' and 'all P is S'? And does there not exist for it the logical name of 'simple conversion'? And what if logic calls the one relation 'valid' and the other 'invalid'? Both seem to belong to the investigation of forms and the subject-matter of logic. Why, then, should not Logic content itself with just registering this difference, so long as there is not conceived to be any one to whom the difference between 'valid' and 'invalid' reasoning appeals, and makes such a difference that he is desirous of achieving the one and of avoiding the other?

The strictly 'logical' position, then, would seem to be that every proposition stands eternally related to an infinity of others in such a way that the 'transitions' (if we continue to use so inappropriate a term) from it to them are in some cases formally valid, but in most cases not. These eternal relations, however, do not in themselves contain any reason why any transitions from any

one of them to any of the others should in fact occur. Hence they constitute no ground for *inference*, nor any reason why the transition should proceed towards any *one* of them rather than towards any other. It follows that the notion of a formally valid inference is a misnomer for these relations which fails to express their essential stability. They are not, and cannot be, strictly *inferences*; nor can any inference be really Formal (cf. § 3 (2) (*e*)). The notion of 'valid inference,' like that of the 'necessity' of thought, is an unmeaning confusion, due to a failure to distinguish between reflection on the formal aspect of a completed inference and the actual process of drawing the (psychological) inference (cf. § 3 (3)).

(2) Even if the traditional schemes of 'valid inference' were intelligible and possessed of any real meaning, it would not follow that they could be trusted to validate or guarantee any actual reasonings. *I.e.* it would not follow that because they were Formally 'valid' in the abstract they were valid in their applications.

(*a*) The first difficulty which confronts any attempt to apply any of these Formal schemes to actual thinking is that of determining the actual meaning of any judgment. And this difficulty is theoretically insoluble for a consistently Formal logic. For as we have abundantly seen (Chap. XI, § 2), all these 'forms' are capable of plurality of senses, and the actual sense of the words used on any occasion can only be determined by referring to the context of the actual live judgment. But such reference is Formally inadmissible. Again, no Formal guarantee is possible that the recognized 'forms' exhaust all the possibilities of meaning. For what a man may manage to mean, and to make intelligible, with a 'form' is a question for psychological observation. Thus the very bricks, out of which the rigid fabric of Formal inference is to be built, are involved in a Protean flux. Not even to so simple a question as 'Is "all S is P" meant in extension or in intension?' is a Formal answer possible.

(*b*) It follows that whatever interpretation of an argument a Formal logician might (arbitrarily) adopt, he

is always liable to be controverted. His interpretation can carry no assurance, because it can always be contested as a misinterpretation of the actual meaning, to which there is always an appeal in fact, whether or not it is admitted into 'logic.' When the real nature of Formal Logic's position on this point is properly understood, it is so far from being an assured method of settling disputes as to be irresistibly provocative of objections even in the most pacific minds. Hence the practical man's contempt for a 'logic' which never intervenes in actual disputes save to darken counsel and to sanction quibbling. The particular way in which the form of the Syllogism exhibits this fundamental defect of the Formal conception of Inference will be considered in Chap. XVI, § 6. Meanwhile, we may so far anticipate as to declare the belief that by putting a reasoning into any particular form it can be made better or absolutely certain, and raised above the possibility of criticism and confutation, to be nothing but an illusion.

§ 6. *Conclusion*

We may conclude, then, that the general discussion of the nature of Inference bodes no good to the Formal analysis of the Syllogism. It would be a miracle, if in view of the suspicions generated by its Formal origin it could, nevertheless, establish itself as a useful form of 'valid' inference.

As regards Immediate Inferences, we may now decide that in so far as any one really has occasion to use these forms, they must be real inferences, and as such must involve real novelty. There need not be much of it; the novelty, *e.g.*, in a transition from 'no S is P' to 'no P is S' may be only in the shifting of the emphasis which the new subject involves; but if and when it is judged to be worth making, it suffices to justify the making of the inference, though it does *not* justify its formal claim to be 'necessarily' true. For of course, just as a shifting of the verbal order may alter and destroy the rhythm of a

sentence, so a shifting of emphasis may alter *and falsify* the meaning which was originally intended, and a formal change of 'subject' may 'change the subject' materially. Hence in real reasoning even the most trivial of immediate inferences involves a risk, and may need scrutiny, nor does it *ever* 'follow of necessity.' If its assertor denies that he has asserted anything new, he is met by the retort, 'Why, then, did you assert it?'; if he admits it, he admits also that the value of the novelty may be inquired into. Mere verbal transformation for verbal transformation's sake does not occur in actual thinking; whether it occurs in Formal Logic and is the essence of the whole 'science' (or game) must be left to the conscience of Formal logicians.

CHAPTER XV

THE SYLLOGISM

§ 1. *The Structure of the Syllogism*

BEFORE studying the disputed questions about the function of the Syllogism and its value as an analysis of thought, it is necessary to familiarize oneself with its structure, and we must, therefore, briefly rehearse the essentials of the syllogistic tradition.

The Syllogism is a combination of three Propositions so arranged that the third, called the *Conclusion*, follows *with logical necessity* from the first two, called the *Premisses*. By 'logical necessity' is meant that no one who has once accepted the premisses as true can refuse to acknowledge the truth of the conclusion. Whether, however, the premisses are in fact true is a question of 'material' knowledge, and does not affect this formal necessity. Only, *if* the premisses are in fact true, the conclusion also must be in fact true. For the Syllogism's structure is such that no truth can be lost in the advance from the premisses to the conclusion. If the premisses are false, nothing can be inferred as to the truth of the conclusion; it cannot be taken as true, nor yet as false; it may be true, or, again, false; the form of the reasoning yields no clue.

The three Propositions contain three Terms, called the *major*, the *minor*, and the *middle*. They are so arranged that each occurs twice, and the middle term, by occurring in each of the premisses, renders possible or 'mediates' an inference about the relation of the minor to the major,

which is expressed in the conclusion. The minor term is the subject in the conclusion, the major the predicate. The middle term is eliminated, and does not occur in the conclusion. The *major premiss* is that which contains the major and the middle, the *minor premiss* that which contains the minor and the middle.

A 'valid' syllogism is one which fulfils all the conditions necessary to generate the *formal truth* (conditional, in fact, on the truth of the premisses) of its conclusion. 'Invalid' syllogisms are *pseudo-syllogisms*, which only mimic the syllogistic form, but may be detected by testing them by the *rules of the Syllogism*.

Of 'valid' syllogisms there are a number of kinds, generated (1) by differences in the position of the middle term in the premisses, and (2) by differences in the sorts of propositions used.

(1) Differences of the first kind are called differences of *Figure*. There are formally four figures of the Syllogism.

(*a*) If the middle term is the subject in the major premiss, and it is the predicate in the minor premiss, the argument is in the first Figure.

(*b*) It is in the second, if the middle term is the predicate in both premisses.

(*c*) It is in the third, if the middle is the subject in both premisses.

(*d*) It is in the fourth, if the order is the converse of the first, *i.e.* if the middle term is the predicate in the major and the subject in the minor premiss.

It is evident that these four arrangements exhaust the possibilities. They may be put symbolically thus :—

Fig. 1.	Fig. 2.	Fig. 3.	Fig. 4.
MP	PM	MP	PM
SM	SM	MS	MS
∴ SP	∴ SP	∴ SP	∴ SP

where M stands for the middle term, S for the minor, the *subject*, and P for the *major*, the *predicate*, of the conclusion.

(2) Differences in the sort of propositions used are called differences of *moods*. As each proposition of a

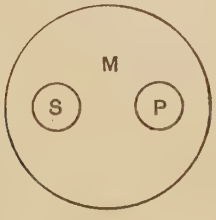
syllogism must be either A, E, I, or O, every syllogism can be expressed by three of these four letters. Thus AAA will mean a syllogism in which the major and the minor premiss and the conclusion are all universal affirmative propositions. It is usual to state the *mood* in this order, *i.e.* with the major premiss first and the conclusion last.

§ 2. *The Rules of the Syllogism*

The number of valid moods in the four figures can be determined by means of the eight *Rules of the Syllogism*, as follows :—

(1) *A syllogism must contain three terms only.* The third term is needed to form a relation between the other two. It is the pivot of the reasoning, and must be *identical* in the two premisses. If it is not, it is *ambiguous*, and breaks the argument in two. We cannot argue from P and M_1 and from S and M_2 to any relation between S and P. The fallacy of *Ambiguous Middle* is a form of the fallacy of *Four Terms*, *quaternio terminorum*, which is open to the same objection (cf. Chap. XXIII, § 3). An argument which, whether true or not, uses four terms is not a syllogism.

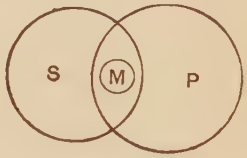
(2) *The Middle Term must be 'distributed' at least once.* For unless we assert about the *whole* of the middle (or the middle as such) at least once, there is nothing to prevent us from relating the minor to one part, and the major to another part, of the middle, which would not establish a relation between the major and the minor at all. To ignore this rule results in the fallacy of *Undistributed Middle*, which may be illustrated thus :—



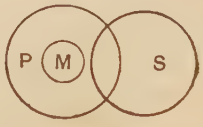
All P is M
All S is M
Yet no S is P.

(3) *No term must be 'distributed' in the conclusion which was not distributed in the premisses.* For to assume knowledge of the whole in the conclusion when only knowledge of part was given would be to go beyond our evidence, and destroy the formal self-sufficiency of our argument. Neglect of this rule entails the fallacies of *Illicit Process* of the major, or of the minor term. Symbolically

All M is P
All M is S
∴ All S is P
= Illicit Process of the Minor.



All M is P
No S is M
∴ No S is P
= Illicit Process of the Major.



(4) *From two negative premisses no conclusion can be drawn.* For by denying the same thing of two others we do not connect them.

(5) *If either premiss is negative, the conclusion must be.* For if the one premiss asserts, and the other denies, a relation of one of the other terms to the middle, the term excluded from the middle cannot be related to that term (or part of the term) which is included in the middle. *E.g.* from all M is P, no S is M, it does not follow that any part of S is P.

(6) Conversely, *to prove a negative conclusion one of the premisses must be negative.* For from two affirmative premisses only relations, and not absence of relation, between the major and the minor term can be inferred.

(7) *From two particular premisses no conclusions can be drawn.* For there are not in the premisses enough 'distributed' terms to avoid fallacies of either Undistributed Middle or Illicit Process. The working out of this derivative rule forms a pretty exercise in Formal Logic.

(8) *If one premiss is particular the conclusion must be particular.* For the same reason as in the last case. On

the other hand, a particular conclusion may often be the only one to be validly drawn from universal premisses.

§ 3. *The Valid Moods*

By the application of these Rules to the possible combinations of the letters A, E, I, and O, three at a time in the four figures, the Valid Moods of the Syllogism may be determined. These may also be arrived at by considering the possible conclusions from the combinations of A, E, I, and O two at a time as premisses in the four figures. The first method first discovers that out of the possible 64 combinations only 11 do not involve a breach of one or other of the syllogistic rules, and then examines each of them in the four figures to see whether in those figures they do not entail a false distribution of terms, under Rules 2 and 3. It turns out that out of a possible 44 only 24 are unexceptionable. But five of these, called *subalterns*, and drawing a 'weakened,' *i.e.* particular, conclusion when a universal was legitimate, are practically neglected as inelegant. The second method is more expeditious, because there are only 16 combinations to be tested.

AA ?A or I	EA ?E or O	IA ?I	OA ?O
AE ?E or O	EI ?O	[IE]	[OE]
AI ?I	[EE]	[II]	[OI]
AO ?O	[EO]	[IO]	[OO]

Of these, 8 may be eliminated—EE, EO, OE, and OO under Rule 4; II, IO, and OI under Rule 7; and IE (with a little reasoning) under Rule 3. The rest must be tested as before in the several figures and yield the same results, which are embodied in the famous mnemonic verses.

> *Barbara,* Celarent,* Darii, Ferio*que prioris;
> *Cesare,* Camestres,* Festino, Baroko* secundae;
> Tertia *Darapti, Disamis, Datisi, Felapton,*
> *Bokardo, Ferison* habet; quarta insuper addit
> *Bramantip, Camenes,* Dimaris, Fesapo, Fresison*;
> Quinque subalterni, totidem generalibus orti,*
> Nomen habent nullum, nec, si bene colligis, usum.

§ 4. *Reduction*

Aristotle believed that the syllogisms of the first figure rested on the self-evident principle known as the *Dictum de Omni et Nullo*, and that their truth, *i.e.* formal validity, was indisputable. This he did not hold to be equally the case in the other figures. So he set himself to show how the arguments in the other figures might be transformed into the first figure, and thereby raised beyond dispute. This process is called *Reduction*, and the mnemonic verses quoted above not only state the valid forms but also contain instructions for their Reduction. Thus the initial letters B, C, D, F of the first four moods indicate also the forms to which the reduction is to take place. The letter *s* means that the proposition it follows should be 'converted' *simply*, the letter *p* that it should be conversion *per accidens* (Chap. XIII, § 2), *m* ('*muta*') means that the premisses should be transposed, and *k* that the reduction is to take place *per impossibile* through an argument in *Barbara*. The last of these processes is not merely a pleasant exercise for the logical mind, but throws an instructive light on the principles of the Syllogism. If we take, *e.g.*, a syllogism in *Baroko*, 'all P is M, some S is not M, ∴ some S is not P,' it is clear that to get it into the order of the first figure we must either convert the major premiss or the conclusion, and thereby turn the major premiss into the minor. But if we convert the major premiss we get an I proposition instead of an A, and from two particular premisses there is no valid conclusion (Rule 7). On the other hand, the conclusion cannot be converted because the conversion of O is impossible (Chap. XIII, § 2). 'Permutation' also had not yet been devised (Chap. XIII, § 2). But the logician could appeal to the internal coherence of the Syllogism. He could argue that if the Syllogism was, as he believed, so coherent that from true premisses syllogistically arranged no false conclusion could be drawn, a disputed form of syllogism could be invalidated only by showing that it might yield a *false* conclusion from *true* premisses. If,

therefore, *Baroko* was an invalid form, its conclusion might be false while yet its premisses remained true. Let us assume, therefore, that the conclusion of *Baroko* is false. If so, its contradictory 'all S is P' must be true. We now have two A propositions and can argue

All S is P
All P is M
∴ All S is M.

This is an argument in *Barbara*, but its conclusion contradicts our original minor premiss 'some S is not M.' In other words, the price of disputing the validity of *Baroko* is a denial of the material truth of one of its premisses. But as it has been throughout assumed that there is no difficulty about the supply of true premisses, this price is prohibitive, and the validity of its form is thus indirectly established.

§ 5. *Criticism*

Systematic criticism of the assumptions on which this formal scheme is constructed must be postponed until we have examined the motives and circumstances of its authors in the next chapter; but it is well to point out how closely knit and consistent (within limits) is the whole structure of the Syllogism. It rests throughout on the notion of formal necessity and ignores all else. It postulates the existence of true premisses and disdains conclusions which may, but need not, be true, even though their probability may indefinitely approach certainty. If I know that 'nearly all Conservatives are opposed to Mr. Lloyd George's fiscal policy,' and that 'Smith is a Conservative,' I can, and probably do, confidently assume that 'Smith is opposed to Mr. Lloyd George's fiscal policy.' But the syllogistic form condemns me; I have committed an 'undistributed middle,' and my conclusion is not 'necessary.' That it is probably true is no extenuation.

All the Rules of the Syllogism are based on this

assumption that a conclusion is worthless, unless it is necessary. But in actual reasoning we often succeed in carrying conviction by arguments which are not expressed in 'valid' forms. (1) We may argue with what are, technically, four terms. *E.g.* 'A is equal to B, B is equal to C, ∴ A is equal to C.' (2) An 'undistributed middle' may, as we saw above, lead to a highly probable conclusion. (3) Illicit Processes may in particular cases be *de facto* true, *e.g.*

'all equiangular triangles are equilateral,'

'all equiangular triangles have their angles equal to two right angles,

'∴ all equilateral triangles have their angles equal to two right angles.'

(4) Formality apart, who will say that nothing can be inferred from the two negative premisses—'The girl did not accept Smith' and 'she did not accept Jones'? (5) Even though 'all M is P' and 'some S is not M' necessitates a negative conclusion only, yet in point of fact 'some S' may be 'P,' to wit, the part about which the minor premiss asserted nothing. (6) If 'a majority voted for A at an election and also for B,' *some* must have voted both for A and for B and very possibly *all* who voted for A also voted for B. Yet the inference is technically 'from two particulars.'

In short, necessity, and not mere truth in point of fact, is what the Syllogism sets out to achieve, and what it must achieve if its claim is to be accepted. Why it should make this claim and how it tries to uphold it we shall see in the next chapter.

CHAPTER XVI

THE THEORY OF THE SYLLOGISM

§ 1. *The Syllogism as a Discovery*

Of all the discoveries which man has made by dint of sheer reflection the Syllogism is assuredly the greatest. Its rise was as sudden and complete and fundamental and epoch-making and irresistible as Newton's discovery of gravitation in the realm of physics. And unlike other first-class discoveries, and more signally even than in Newton's case, this discovery had not been anticipated by any one. Not even the tooth of envy could detract from the originality of its discoverer or suggest that its glory ought to have been shared with others safely resting in their graves.

Aristotle quite realized the greatness of his discovery, and exploited it to the full. It gave him a sense of immeasurable superiority over all his predecessors, and an agreeable conviction that he had built himself a monument for all time. His self-esteem it is hard to censure; for he had not only made a capital discovery, but had worked out its consequences with singular acumen and completeness.

Yet it is possible that he exaggerated the value, and overlooked the defects, of his discovery, and that his false estimate has impressed itself as indelibly on the human mind as the Syllogism itself. He was in a manner entitled to think that his discovery was the making of Logic. It certainly made Logic a subject the meanest intelligence could not but recognize as definite, and the

least pedantic as worthy of examination. It was therefore at once adopted for educational purposes, and its very defects have assured it an honourable place in the literary curriculum ever since. Next to 'Euclid' it has been the most profitable of Greek speculations. To this day hundreds of professors owe their daily bread to Aristotle.

Yet from the standpoint of scientific logic the Syllogism was a more doubtful boon. It may, indeed, be contended that although it made Logic, it also made its progress almost impossible. For it soon became an obsession from which there was practically no escape. Even when subsequent logicians were stirred to protests against its authority, they still allowed the fascination of its form to determine their ideal of knowledge, and then, sooner or later, more obviously or more obscurely, they fell back into the clutches of the Formal Logic of which the Syllogism remained the acme and *ne plus ultra*. What they attempted to put in the Syllogism's place, therefore, was always something quite as formal, quite as impotent, and quite as illusory. The great majority of logicians, however, were no rebels. For more than two thousand years they have piously believed that in the Syllogism they had discerned the universal form of valid thought and reached its haven, nay, its heaven. So they carefully shaped their doctrines so as to lead up to the Syllogism. The classifications of propositions, their oppositions and conversions, definition and division, all had for their real aim the easier manipulation of syllogisms.

Of late, however, it has become more and more difficult to stifle the voice of criticism. In spite of their traditional dependence on Aristotle, attacks by logicians on the central citadel of Formal Logic have multiplied [1] in frequency and severity, until the logician's paradise threatens to become his purgatory. A good many of these attacks can be repulsed (with more or less loss on both sides), but all are worthy of examination. Because, if any one

[1] Even in Oxford.

of them is unanswerable, it means the downfall of Formal Logic.[1]

§ 2. *The Origins of the Syllogism*

Greek Logic, like all the sciences, arose out of a practical need. It was necessary to make a definite tribunal, to discover an authoritative standard, for the decision of disputes. The growth of democracy in the fifth century B.C., which rendered political distinction dependent on skill in public debates before assemblies of the sovereign people, and security of life and property dependent on the forensic arts of working on the feelings of large bodies of jurymen, put an enormous premium on the development of rhetoric and logic. It was soon discovered that though persuasion was the ultimate aim of the public speaker, yet the persuasiveness of a good argument was far greater than that of a bad one. What, then, was a good argument, and how could it be distinguished from a bad one? The desire to answer this question led to the development of logic. The Sophists began the inquiry, and the philosophers, abandoning for a while unprofitable speculations about physics and metaphysics, followed in their wake. The schools, both of sophists and philosophers, became practising grounds for the serious business of public speaking. Socrates invented the art of cross-examination, and enormously stimulated the fashionable game of 'dialectics'; Plato and Aristotle perfected the tradition. Each generation of thinkers went about seeking for a sign by which they might surely know when they had proved their case.

The surest sign they could find was that an opponent should be *forced* to confess himself beaten, either by admitting the truth of what he had begun by denying, or by contradicting himself and denying what he had asserted. The rules of the game of 'Dialectic' were quite strict: a thesis must be upheld in its verbal integrity, and any

[1] Intellectually, of course, not practically. Practically it can only be superseded by an alternative which appeals as strongly to the instincts which generated it. And these instincts lie very near the roots of our intellectual life.

departure from its formulation meant defeat. Socrates in particular was an adept at entangling his opponent in the toils of a confutation (ἔλεγχος) and inducing him to contradict himself. Plato appears to have added a method of systematically driving an opponent into a corner by a progressive narrowing of the field of discourse by successive 'Divisions.' But neither of these methods seemed to Aristotle to be sufficiently *cogent*. They might beguile an opponent into an untenable position, but they could not *force* him into it, and *compel* him to surrender. He had to be convicted by concessions out of his own mouth, and so long as concessions had to be asked for he might be wily enough to refuse them. Dialectics, therefore, could not be made coercive.

Nor were they truly scientific, for true science also, as opposed to the laxity of mere 'opinion,' was coercive, and capable of extorting assent to its conclusions from all minds. What was wanted, therefore, alike for the conduct of disputes and for the framing of demonstrations, was a method so coercive that, once committed to it, there was no escape for any one.

Aristotle believed that in the Syllogism he had obtained an instrument which would achieve both these *desiderata*. On the one hand, it could be used to clinch discussion and to provide an easy and applicable test for deciding which of the contending parties was right; in face of a valid syllogism starting from true premisses all dispute must cease. On the other hand, it formulated also the ideal of true knowledge, and the universal form of demonstrative reasoning. All scientific truths were capable of formulation in scientific syllogisms, which, proceeding from principles, 'primary,' 'true,' 'self-evident,' 'prior,' and 'better known,' stated the 'causes' (or grounds) of the conclusions which they demonstrated.

What was common to both the dialectical and the scientific use of the syllogistic form was its irresistible cogency, the 'necessity' on which we saw (Chap. XV, § 5) all the rules of the Syllogism rested. If Aristotle had considered it possible that the premisses of a syllogism

might be severally accepted and yet its conclusion be denied when they were combined, he would have felt that the Syllogism had failed of its dialectical function. Similarly, if he had thought that science could not realize the ideal of absolute demonstration, and that its advances did not depend on, demand, or amount to, demonstration, he would have felt that the syllogistic form had been stripped of its scientific *raison d'être*. It has been left to professional upholders of Formal Logic to continue calmly to exploit it after they had noted its impotence in both these respects.

§ 3. *Aristotle's Account of the Syllogism*

Accordingly Aristotle makes the coerciveness of the Syllogism, its power to *compel* assent, one of the chief features in his definition. A syllogism is 'a reasoning in which there results, (1) from certain premisses *posited*, (2) of *necessity* and in virtue of their being such, (3) something *other* than those presuppositions.'[1]

This definition embodies the three characteristic demands of the Syllogism, viz. (1) the postulation of true premisses, (2) the demand for an intrinsic, self-contained and formal necessity, (3) the requirement of novelty. On the other hand, it really defines *more* than the actual Syllogism. It is a definition of the Formal conception of a 'valid inference.' So it does not mention that the premisses must be two and the terms three, and held together by the identity of the middle term. This, however, is really an advantage; for it makes it clearer that with the Aristotelian definition of Syllogism stands and falls the whole Formal conception of Inference. It is, therefore, in the first instance these three fundamental claims which must be shown to be unfounded by those who suspect the soundness of the Formal conception of Inference.

[1] *Prior Analytics*, I, chap. xxiv.

§ 4. *The Postulation of True Premisses*

This question is not really a question for Logic, but for Science. Or, rather, the logical postulate about true premisses is an assumption about the nature of scientific knowledge, which, though it long seemed plausible, can no longer be regarded as true. It assumes that the sciences are the handmaids of Logic, eager and able to do all the dirty work of research, and on its completion to hand over to the logician the material he requires for his purer contemplations. But, as was hinted in the beginning (Chap. I, § 2), this conception of the ability and attitude of Science does not seem to accord with the facts. The sciences never seem to finish their operations in time for the logician to begin his. They never profess themselves convinced of the *absolute* truth of their results. They take them as true, no doubt, for the time being, and until they can be corrected or superseded by better, but they seem to object on principle to any assertion of finality. If, therefore, the logician demands absolutely certain truth, he will not get any science to guarantee it him, nor will he be listened to when he censures the sciences for not yielding him the impossible sort of truth he desires.

In view of this fact he ought seriously to reconsider his position. He should admit that he has no right to take the truth of his premisses as more than probable, and the truth of his conclusion as more than conditional. Now this means that he cannot entirely emancipate himself as he thought, from the consideration of *truth of fact*, and devote himself wholly to *truth of form*. For, however perfect his reasoning may be within the syllogism, his result may always be wrong in fact, because there has been a hitherto unsuspected error in the premisses. Indeed, the wrongness in fact of the results deduced by the logician may be what convinces the scientist that he has supplied false premisses. The logician should be proud of this service, while the scientist should be grateful for the correction. Unfortunately, this is not how the logician commonly takes the situation. He is more

apt to regard it as what Huxley called 'Herbert Spencer's idea of a tragedy,' viz. 'a deduction killed by a fact,' and to show himself annoyed that his deduction has been refuted, annoyed with the scientist, and annoyed by the facts; nay, tempted to uphold his 'deductions' against them. This, however, he has no logical right to do. For the event has merely shown that the guarantee of the truth of his premisses was insufficient.

The logical effect should rather be the renunciation, or relegation to another and better world, of the Aristotelian ideal of scientific demonstration. If the scientist repudiates it as too high for his powers, the logician must acquiesce. He must not be obstinate in upholding an 'ideal' of 'demonstration' which has no application to human knowledge. He must confess that much as he would have liked to prove truths categorically about reality by the force of pure reasoning alone, he can in fact only prove conditionally and subject to continuous confirmation by experience. But he may console himself with the idea that he is after all quite as useful, if not quite as exalted, a personage, if he cuts his coat according to his cloth and assists the scientist in the establishment of 'earthly' truths, as if he strutted about in 'ideal' habiliments which are not visible to the eye of Science, like Hans Andersen's shockingly underdressed Emperor.

For, after all, it is no great hardship that the Syllogism should cease to demand absolute truth from its premisses. The guarantee it could give was never more than hypothetical ('*if* the premisses *were* true my conclusion is true'), and it had no means of really assuring itself of the alleged truth of the premisses it had taken on trust. The effect of its postulate was entirely imaginary and emotional. It made no difference to the form of a syllogistic argument. It contributed nothing to its strength. It does not alter its practice. For the logician, though he despises them, is perfectly familiar with conditionally true premisses, and can argue with them just as well. Why, then, should he care, *qua* logician, whether his premisses are true absolutely, or provisionally, or not

at all? How is his status, *qua* logician, lowered? It is only as a revealer of reality, or *qua* metaphysician, that his *rôle* is not so important as Aristotle had imagined. But, then, had he a right to play this part at all? Would it not be better to keep apart the problem of logical proof from the business of constructing scientific truths and the aspiration of detecting ultimate reality?

The Syllogism, then, is not seriously damaged by being shorn of its pretensions to enunciate (in unspecified cases) absolute verities, and by withdrawing its demand for more truth than science can supply.

§ 5. *The Intrinsic Necessity of the Syllogism*

The Syllogism's claim to necessity is much more vital both as regards its validity as a form and its value as an instrument of logic. We have seen in Chap. XV how its whole structure was dominated and pervaded by the idea of *necessity*, and in § 2 how greatly its professional triumph depended on its ability to *compel assent.* If therefore its claim to necessity breaks down, both its logical function and its internal structure would seem to be destroyed. Yet this claim is far from invulnerable, and our preliminary discussion of logical necessity in Chap. XIV, § 3, may be thought to presage a collapse.

It is easy, in the first place, to detect that the 'necessity' of syllogistic reasoning is wholly of the *ex post facto* character which was explained and criticized in Chap. XIV, § 3. It exists, *after the syllogism has been constructed*, in the completed form. It lies in the relation between the conclusion and the premisses, which is found after the premisses have been put together. But it has no connexion whatever with any necessity of *constructing* the syllogism, nor has it anything to say about this. About the making of any actual syllogism Formal Logic tells us nothing, knows nothing, and is willing to learn nothing. Here we come upon a region full of interesting questions which the Formal Syllogism entirely ignores. How did the premisses come about, and come together? Why, of all the proposi-

tions that might have been asserted was the major premiss chosen? And why the minor? Did the conclusion come first or last? Was it a *bona fide* deduction from admitted truths, or a thesis bolstered up with reasons?

The Syllogism in its Formal completeness has no answer to such questions. But is it self-evident that they are irrelevant and extra-logical?

It is clearly hazardous silently to antedate the *ex post facto* necessity, and to transfer it to what is for Formal Logic unexplored ground. Indeed the logician's claim that his syllogism proves the necessity of thought from start to finish, and reveals its universal form, simply because this structure has been generated somehow and he sees no way of repudiating its conclusion, is much as though a social reformer, looking at a row of jerry-built three-roomed cottages should agree that they exhibited the universal and formally perfect type of building houses; because, you know, no part of them could be removed without entailing a collapse of the whole. True, we exclaim in both cases, true *of the building*; but what, pray, of the *builder*? Need he have built thus, and there, and then, and out of such materials?

The necessity of a syllogistic structure *after* it has been compiled must be regarded as wholly distinct from, and irrelevant to, the question of what necessity was inherent in the thought which constructed it. And only the latter is relevant to the question whether the syllogism can compel assent. For if any disputant may go into its making, he can dispute its application, its relevance to the issue, and declare it an *ignoratio elenchi*, without impugning its formal completeness. He may, therefore, refuse to make this particular syllogism. But if he cannot be compelled to combine the premisses which lead to this particular conclusion, what is the use of pointing out that the conclusion would be inevitable, if he (or some one) would only be good enough to make it so by adopting the premisses? If he is in point of fact at liberty to select premisses of his own as he pleases, and to reject one or both of those his opponent

has chosen, what sense is there in saying that he can be *forced* to the desired conclusion? There may possibly ensue a wrangle about *what* premisses are admissible and relevant to the disputed point, but there are no Formal ways of settling it, nor is there any compulsion. This explains, of course, why the discovery of the Syllogism has not in fact altered the methods of controversy nor affected the vitality of disputes. The contending parties do not use or acknowledge the same premisses, and, therefore, do not draw the same conclusions. A party that has reason to suspect that the use of certain premisses would be formally fatal to its claims simply does not accept, but contests or ignores, those premisses. It only looks at, and for, premisses which will support its own conclusions. For any argument to be decisive, the parties to it must be willing to argue the matter out honestly, and must begin by placing themselves on some common ground. And this they rarely consent to do, and can *never* be compelled to do.

As a form, therefore, the Syllogism is impotent and has no power of compulsion. The initial selection of the premisses to any argument rests as much on mutual concessions and agreements as ever it did in Plato's Dialectic. But this result, which is the condemnation of the Syllogism in the eyes of bigots and dogmatists, is really greatly to its credit. For it means that even the chosen instrument of dogmatism which, in the hands of multitudinous professors, has wrought more woe to the freedom of thought than even the Inquisition at its worst, the Syllogism itself, points, after its fashion, to a better theory which makes *satisfaction*, and not *compulsion*, into its differentia of truth (cf. Chap. XXV, §§ 3, 5).

And if we follow the clue put in our hands by the failure of the Formal account of the Syllogism's nature, we shall easily see that the selection of its premisses is always the product of a free choice among the infinite possibilities of knowledge.[1] We may put together our

[1] Not, of course, that in any particular case the choice is ever practically unlimited.

premisses from any acknowledged bodies of truth, and discover new relations between them which revolutionize the routine of human thought. Thus Newton took one premiss from the moon, and another from his apple-tree, and put them together into the theory of gravitation. Darwin took one premiss from Malthus and another from the experience of stock-breeders, both of which were perfectly familiar and undeniable but which had never been viewed together, and produced as their conclusion his new theory of Natural Selection, which changed the principles of biology, ethics, politics, and theology, and is even tardily transforming the remote abstractions of Formal Logic (cf. Chap. V, § 8). Similarly, we may take an undeniable premiss from psychology, to wit, the existence of purposes, and another from logic, to wit, the existence of error, and produce thereby a new theory of knowledge which transforms all the old dogmas to the intense disgust of old-fashioned logicians. So long as all the relations of every truth with every other have not been worked out, every science must remain exposed to such discoveries. And when they have been all worked out, how could Inference survive the last discovery? For who could have a reason, or the heart, to reiterate idly truths that were already known to all?

It is necessary then to vindicate the Freedom of Thought against the 'Necessity' of Formal Logic, and to show the impotence of the latter to curb the former. With this demonstration an essential part of the Formal Syllogism is disposed of. Its formal cogency is of our making and our choosing, and need never involve any real compulsion.

As for the 'necessity of logical connexion,' it is nothing but an illusion engendered by Formal Logic. While the process of thought is still active, the logician keeps out of the way, and has nothing to say to it; for his vulturine 'analysis' never ventures to attack a living thought. He appears upon the scene when the thinking is defunct and over. He then strips the carcase of its flesh and blood, that is, abstracts from the thought's relations to the

interests and idiosyncrasies of those who thought it. He disarticulates it, and casts aside the sinews, the value and purpose of the reasoning, as 'merely psychological,' and joins together its bare bones, to wit the *verbal forms* of the 'propositions' it has used, with the artificial wiring he calls 'connecting logically,' and finally offers us the jerky contortions of this anatomical preparation in lieu of the graceful flow of the actual thought. In other words, 'logical analysis' first destroys the *real* connexions between thoughts, and then *feigns* false ones that suit the arbitrary abstractions of Formal Logic. What it 'analyses' cannot be real, and what is real it refuses to analyse, and for this *double falsification* it demands the approval of all rational intelligence!

§ 6. *The Formal Ambiguity of the Middle Term*

But criticism may burrow yet deeper in the Syllogism's vitals. *Is it after all true that, taken as a form, the Syllogism is incontestable?* Is there no way of accepting its premisses and yet denying its conclusion? Logicians have universally believed there was none, until Mr. Alfred Sidgwick's epoch-making criticism broke through the very centre of the Formalist position.[1]

The 'last infirmity of even the most faultless syllogisms,' as he says, is 'liability to the defect technically called *ambiguity of the middle term*' (cf. Chaps. XV, § 2, XXIII, § 3). And as this 'defect' will be found to be incurable, and inherent both in the form and in the use of the Syllogism as such, it seems clear that no disputant need ever be compelled by the mere form of any syllogism to accept its conclusion. He can always retort—'No, your syllogism is null and void; there is an ambiguity in your Middle; and so, though I quite admit your premisses separately and in the abstract, they are fallacious in their combination, and your conclusion does not hold.'

[1] See especially *The Use of Words in Reasoning*, chap. ii, § 13, and chap. iv, § 28.

It is astonishing that to so simple and so deadly an objection, which goes straight to the heart of the Syllogism, Formal Logic should have attempted no reply; the explanation probably is that though Mr. Sidgwick's point was so simple it was too novel for logicians to grasp. A real novelty has to be born many times over before some minds will consent to see it: they cannot understand anything new until it has grown old, which is why they cling to the belief that there is nothing new under the sun. We must try, therefore, to reiterate the point of Mr. Sidgwick's criticism, and to drive it home.

The identity of the middle term was, as we saw (Chap. XV, § 2), admittedly the pivot on which the whole Syllogism hinged. If it splits in two, the whole argument goes to pieces. We also found (Chap. X, § 10) that in a significant judgment the 'identity' could never be absolute, but must always mean the postulate of an irrelevance of differences. Hence it follows that the reality of the identity, which the Syllogism claims to express in the middle term, or otherwise, the irrelevance of the differences which are abstracted from, must always be open to question. It must always be possible to say—'this which you have taken to be an identity entitling you to reason from one case of "the same" to another, is a merely *verbal* identity. There is an important difference between the two cases, which the word slurs over, and your middle term breaks in two.' This is in effect what Mr. Sidgwick says.

Now, how is Formal Logic prepared to meet this attack? Ordinarily the identity of the middle term is postulated as a matter of course on merely verbal evidence; we are merely warned that if the middle is ambiguous, there is no syllogism. But if the middle may always be ambiguous, is there ever a syllogism? And does a form of words which looks like a syllogism ever prove anything? Manifestly this official explanation does not meet the case where each of the premisses, in ordinary contexts and for ordinary purposes, would be true, and where in consequence they would be called true

in the abstract, and regarded as applicable to the general run of cases, but where, nevertheless, when the premisses are put together for the purpose of drawing a particular conclusion, one or the other of them *ceases to be true in that context*, and becomes misleading, so that the inference turns out to be *de facto* wrong. For example, it may be generally true that 'all men love good stories,' and undeniable that 'Smith is a man'; yet the inference that 'therefore Smith loves this good story,' may be falsified in this particular case by the fact that the story is told about him, and that, therefore, he hates it. Now technically this result may be ascribed to an ambiguity of the middle term.[1] Smith is in general a 'man' and, therefore, loves good stories, but he is *not* a 'man' for the purpose of this particular conclusion; and so the sense of 'man' in the two premisses is not the same, and this vitiates the argument.

It may easily be seen both that *any* syllogism is exposed to the same objection, and that Formal Logic has no means of coping with it. For the ambiguity does not exist in the form, nor in the words of the premisses, nor even in the premisses separately and in the abstract. The attempt, therefore, to treat 'ambiguity of the Middle' as formally 'fallacious' is a failure, and (incidentally) *breaks down the whole distinction between 'form' and 'matter' on which Formal Logic rests.* For whether in any actual syllogism the Middle is 'ambiguous' and the argument therefore suffers from the *formal* defect of *quaternio terminorum* or not, depends on *material* knowledge of its actual context. No amount of reflection on the form of the syllogism will reveal the ambiguity, because it arises only when the premisses are combined for the purpose of using them, *i.e.* of applying them to a particular case.

[1] It may also be called a 'fallacy of accident,' which is not classified as a *formal* fallacy; but this does not alter the fact that it is the form as such of the Syllogism which is liable to, and the standpoint of Formal Logic which is responsible for, the result. Or otherwise, it is arbitrary whether the ambiguity of the middle is described as a 'fallacy of accident,' or the form of the Syllogism is itself regarded as involving this fallacy, as Capt. H. V. Knox would prefer to put it: in either case it is clear that the Syllogism argues *a dicto simpliciter*, viz. the general rule laid down in the major premiss, *ad dictum secundum quid*, viz. to a particular application of it (cf. Chap. XXIII, § 5).

And concerning the combining of premisses and the construction of syllogisms we saw that Formal Logic could tell us nothing (§ 5). It was entitled, nay, bound, to regard the subject as extra-logical, because it clearly implies a psychological knowledge of the nature and purposes of the makers of syllogisms. Yet it now appears that to leave men at liberty to combine premisses and to construct syllogisms as they please, leaves them the power to defeat any formal inference and to repudiate the authority of Formal reasoning. Formal Logic no doubt did not perceive the far-reaching consequences of its haughty refusal to concern itself with the making of syllogisms.

The only way of meeting a contention that the application of a syllogistic form to an actual case has engendered ambiguity in the middle, is not open to Formal Logic. It consists in asking wherein lies the ambiguity for the purpose of the particular argument, and in denying that the mere formal possibility that the postulated identity may not be sound and that the ignored differences may be relevant, suffices *in this case* to vitiate the argument. But this reply, of course, implies that the argument is recognised to have a purpose, and that we must know it in order to understand the argument. But neither of these admissions can be made, without giving up the abstraction, and destroying the ideal, of Formal Logic.

§ 7. *The Function of the 'Ambiguity'*

In the eyes of Formal Logic, therefore, the ambiguity of the middle is a fatal and incurable defect, which utterly invalidates and destroys the Syllogism's claim to be necessarily true as a matter of form. Nor would it avail to attempt consolation, and to point to compensations. It could never be brought to see that in actual reasoning the so-called 'defect' works out as a safeguard against hasty inference. It is only for a logic of real reasoning that the 'defect' would disappear. For such a logic would have grasped that it is a condition of significant

assertion that a judgment should bear on a real doubt, and that question-begging by means of merely verbal identities is a constant danger to right reasoning. It would consequently see that the syllogistic form has value only if, and in so far as, it serves to elucidate a disputed point. Now, theoretically, there is always a risk in arguing from one 'case' to another. There are, and must be, always differences between the cases, and these must always be ignored, in order to construct the 'identities' we reason with. There may always be a question whether we have done right. The advantage of putting the argument in syllogistic form is that experience shows that *when we have done wrong* the mischief shows itself as an ambiguity in the middle term. And in this shape it may be easier to detect. Thus the real value of this possibility of ambiguity is that it raises in a concise and crucial way the question whether an argument is really sound. Its middle term is always an abstraction. The abstraction is challenged, and has to be defended. It is defended by showing that the differences insisted on are not relevant to the point at issue, and that the identity is nevertheless for that purpose sound. So the real moral of the difficulty becomes that the *meaning* of the Syllogism cannot be dissevered from its *use*, nor its use from the purposes of its users, and that the contrary view refutes itself by rendering the abstract form unmeaning and, even formally, 'invalid.'

§ 8. *The Claim to Novelty*

The Syllogism's claim to novelty is by no means new, but it does not seem to grow more convincing as it grows older. To discuss it we must first of all distinguish sharply between the questions, (1) whether novelties can be conveyed in syllogistic forms, and (2) whether *the syllogistic form as such* indicates how novelty may be conveyed. The former claim we have admitted (§ 5), but it does not help the Formal interpretation of the Syllogism. As for the second claim we saw in Chap.

XIV that novelty was essentially 'psychological,' and could not exist in the 'ideal' of completed knowledge (§ 4), but also that the notion of a Formally 'valid' inference was inherently unmeaning (§ 5), because the very notion of *inferring* implies the constructing of the system of truths which the notion of *validity* assumes to be already completed. What, then, can it mean to claim novelty for the conclusion of the syllogistic form?

(1) There is clearly a *verbal* difference, and this is perhaps all that Aristotle really meant. For he only said that the conclusion was 'other' than the premisses, and abstained from calling it 'new.' But Formal Logic now aspires, however vainly, to be more than verbal.

(2) Logicians are nowadays agreed that the Formal Syllogism is not an instrument of discovery, and that their science is not an 'organon' whereby new truths are calculated into existence without dependence on experience, as was believed for just about 2000 years, from the third century B.C. to the seventeenth century A.D. In this sense, then, novelty is no longer claimed for the Syllogism.

(3) The real puzzle about the novelty of the conclusion is to understand how it can possibly be compatible with its dependence on the premisses. If the dependence is to be formal, the premisses must already contain the conclusion; otherwise the conclusion will not follow from them alone, but demands 'material' knowledge as well. But if the conclusion already is formally contained in the premisses, how can it possibly be new? How can the premisses truly be asserted unless the truth of the conclusion is already known? And does it not, then, become a solemn farce to extract the conclusion from them, and to exhibit it as something new? If 'all men are mortal' and 'Smith is a man,' what is there new in 'Therefore Smith is mortal'? For unless it had been known that Smith was mortal, it could not truly have been asserted that all men were mortal. The Syllogism, therefore, as a form of reasoning, seems necessarily to argue in a circle: openly and officially the truth of the conclusion depends

on that of the premisses; but the truth of the premisses secretly presupposes the truth of the conclusion, and assumes the point it professes to prove, and the technical name for such begging of the question is *Petitio Principii* (Chap. XXIII, § 4). Is such, then, the real nature of the typical form of 'valid inference'?

§ 9. *Is the Syllogism a Petitio Principii?*

The case looks pretty black, and no extenuating circumstances or technicalities will acquit the accused. It will not do *e.g.* to plead that the fallacy of *petitio principii* technically implies *two* Syllogisms, or that the premisses have been acquired successively, or that though the conclusion follows necessarily, it is from the two premisses together and not from either of them alone, and is not begged, because the real inference lies in the combining of the premisses. A consistent Formal Logic can find no way of escape in any of these directions, because it contemplates the Syllogism only as a completed form.

Still it does not despair of making a defence even on Formal grounds.

(1) It admits that if the Syllogism is construed in extension, the question is begged. If 'all men are mortal' means all the individual men, the mortality of Smith is certainly part of the evidence for the truth of the major premiss; if it was known, therefore, there was no real inference and nothing new; if not, it is just the question to be proved. In neither case do the premisses really prove the conclusion.

(2) It admits also that to take the major premiss as a definition, and so to exclude from the kind or species 'man' any creature, however man-like otherwise, who did not possess the essential attribute of mortality, is only a subterfuge which does nothing but shift the *petitio* from the major premiss to the minor. For if we say that Smith must be mortal, because if he is not, he is not a man, we beg the question in calling him a man; or else we are using 'man' ambiguously, as implying mortality

ex vi definitionis in the major premiss, but not in the minor (cf. § 6). On either view the argument is formally unsound.

All that this defence, therefore, brings out is the power we have of keeping our definitions technically 'true' by an arbitrary fiat in spite of the facts, and the logician may even be ill advised enough to point with pride to frequent cases in the sciences where convenient 'truths' have *not* been sacrificed to growing knowledge. For example, the truth that 'all swans are white' was not upset by the discovery of black swans in Australia. For science did not judge fit to allow them to blacken the spotless reputation of the genus *Cygnus*, but accommodated them under another, as *Chenopis atrata*. Hence the assertion '*some* swans are black' could be triumphantly refuted by 'No, sir, this black bird is not properly a swan; it may look like one, but it is *Chenopis* and not *Cygnus*.'

(3) The Formal Logician, however, really hopes to rebut the accusation by interpreting the syllogism in intension. He does not stoop to explain how his interpretation, even if true, would vindicate syllogisms intended in extension, nor how he would discriminate valid reasonings in intension from invalid question-beggings in extension by their form alone, seeing that *in form* they do not differ, and that an appeal to their actual meaning involves 'psychological' knowledge. But still his interpretation seems more plausible, and the *petitio*, if it exists, is at least less obvious.

'All men are mortal,' then, properly means that by a law of nature mortality is an attribute of humanity. It is no attempt at an exhaustive enumeration of all men. Similarly, the minor premiss is a placing of an individual in a class with others. 'Smith is a man' brings him under the 'kind' to which he belongs, and the conclusion successfully attaches to him an attribute of his kind, which otherwise we should not have known he possessed.

Perhaps, however, this interpretation also begs the question in a subtler way. How do we know that because

Smith is a 'man' he possesses all the attributes of humanity? And how do we arrive at the class 'man'? And how do we know that 'Smith' is *rightly* classed in it?

Of course it is clear that *if* it is true that there are real classes in nature and we have really discovered them, and if it is further true that all the individuals of a class have precisely the same attributes, and that every individual is necessarily provided with a class and properly classified in it, and if we can *know* all this for certain, 'Smith' cannot prove recalcitrant to the cosmic order, and the conclusion about him holds. But if these assumptions are not true, the Syllogism still remains a begging of the question.

Now, in fact, all these assumptions are false, or at least extremely doubtful. (1) Even if 'kinds' are real, and not merely conveniences of classification, as Darwinism gives us every reason to believe (Chap. V, § 8), it can hardly be maintained that we have completely discovered them. (2) It is certainly untrue that because an individual belongs to a class for most purposes, he can also have attributed to him *all* the qualities found in other members of this class. A Papuan logician with a limited knowledge of mankind might no doubt argue that because all (or even some) 'men' are frizzly-haired black cannibals, Smith was the same. If we answered—'No, he need only have the *essential* qualities of his kind, and he happens to be a fair straight-haired vegetarian,' should we not be admitting that from the qualities actually found among men a *selection* has to be made? (cf. Chap. V, § 7). And does not whoever makes a selection take a risk? May he not select what is 'unessential,' *i.e.* unimportant for his purpose, and omit what is essential? If so, his reasoning is always liable to go wrong. It may be that to prove his conclusion he should not have classified Smith in the class 'man,' but in some sub-class. And (3) to the process of subdividing classes in order to accommodate special 'cases' there is no theoretic end. Smith may be an individual so peculiar, and the purpose for which he is being argued about may be so special, that

he will turn out to be *sui generis*, like an angel, and disappoint all expectations based on his likeness to other 'men.' Lastly (4) if it were true that universal rules about a 'kind' formed an absolute guarantee of the behaviour of every 'case' of the 'kind,' should we not be merely relapsing into the old dilemma? For if we *know* this to be true, Smith's submission to the law of mortality tells us nothing new; if we do *not* know it, is it not assumed without a warrant?

It is our duty, therefore, to ask how much of all this the logician may be supposed to know when he asserts that because Smith is a man he is mortal. *Does he know that Smith is a 'man' for the purpose of his conclusion or does he not?*

If (*a*) he does know this, his 'inference' is a sham, and his result is nothing new. For *ex hypothesi* he already knows that Smith's case comes under the law, that 'humanity' is predicable of him and likewise 'mortality.' There was no need, therefore, to make a syllogism, to appeal to his humanity to prove his mortality; he knew all along that mortality was among Smith's attributes.

If (*b*) he does *not* know that Smith's case comes under the law, but thinks it possible that, by some divine grace or wonderful discovery, Smith has been enabled to evade it,[1] he begs the question. For he *assumes* that because Smith is in many other respects like the men who die, he too is bound to die. But this is the very point to be proved. The question was—Is the likeness of the *right kind* and *sufficient* to warrant the inference? Are the differences really irrelevant? It is no proof of this to assert that there is *some* likeness. Because Smith is like enough to other 'men' to be called 'man,' it does not follow that he is like enough to be called 'mortal.' If this be the true meaning of the syllogistic form, viz. that a 'case' of a 'rule' (or 'law' or 'universal') is 'proved' to be no exception to the general rule, by *assuming that the rule applies to it*, then this last interpretation of the

[1] Cf. Cardinal Newman's argument about Elijah in the *Grammar of Assent* p. 280.

Syllogism makes it the supreme example of a shameless *Petitio Principii.*

§ 10. *The Real Meaning of Novelty*

The demand for novelty, therefore, cannot be Formally sustained. If the Syllogism yields novelty, it begs the question. If it disclaims novelty, it becomes vain repetition. As a form, therefore, it is either futile or false, and Formal Logic is just as incapable of giving a real meaning to the demand for novelty as to the demands for necessity and truth.

The simple reason for its *fiasco* is that it has refused to consider anything but the *form* of inference, and has abstracted from its matter, its maker, its making, and its purpose, without seeing that it was thereby abstracting from its meaning. It has contemplated only the completed form and asked no questions as to how and why it was formed. Had it inquired into this, it would speedily have found that its embarrassments were of its own making.

In actual reasoning the primary fact about a Syllogism (as about any other sort of real inference 'valid' or invalid) is that it has to be made. If, therefore, we condescend to study actual thought, we have to study its making. Its premisses have to be asserted and combined, and motives have to be felt for asserting and combining them. Now, it may often happen that we effect combinations of premisses which surprise us, and strike us as novel. They may strike others equally. But whether we or others, some or all, appreciate the novelty, does not alter its character.[1] It is in all cases 'psychological'; and it is over when the inference is over. The inference is over when the premisses have been brought together. That is the real achievement of thought; the conclusion follows, as a matter of course, or of verbal 'necessity.' In other words, any one can see that it *must* be drawn, and that

[1] 'Logical' novelty would thus seem to mean only inference which strikes all minds as novel.

it *was* contained in the premisses. Of course, if this tense is ignored and the conclusion is antedated, the novelty disappears and the inference becomes unintelligible. Inability to understand inference is thus part of the price Formal Logic has to pay for abstracting from the time-relations in actual thought (cf. Chap. IX, § 2). What, then, remains for it to contemplate? What remains after the inferring is dead and done with is not the real inference, but only its defunct 'form' *in words*. The 'form' does not contain novelty, because it does not contain meaning. It is a form *for meaning*; its meaning is potential, not actual. Hence no 'analysis' can ever extract a meaning that has departed from it. The real meaning, the real novelty, the real validity, lay in the act of inferring, lay in the irretrievable past, and all this, for various bad reasons, Formal Logic has held to be 'extra-logical'!

We get the same disappearance of novelty in the transition from actual thinking to the 'form,' when instead of tracing the motion of thought from premisses to conclusion, we study the opposite case of a recoil of thought upon its grounds. In this case there is no discovering or drawing of the conclusion. The conclusion is what we start from. It is a judgment we have made, for sundry psychological reasons, which has now to be supported 'logically.' Naturally the novelty now does not lie in the 'conclusion,' but in the grounds which may be given for it. The problem, therefore, is to find premisses which will prove it. But is it not as serious an indictment as can well be imagined of the Formal 'analysis' of the reasoning that it should not distinguish between these two cases, the finding of the conclusion and the finding of the premisses, but should confound the forward and the backward movement of thought, simply because in the completed 'form,' when the movement has ceased, they are indiscernible?

Once we have disabused our minds of the idea that the Formal standpoint anywhere gets in touch with actual meaning, we can easily rehabilitate the syllogistic forms. Once they are supplied with the flesh and blood of human

thinking, they become alive and capable of answering our questions. We begin to see how they must be interpreted so as *not* to beg the question, and that when alive they are without exception 'valid.' Thus even our hackneyed example of Smith's mortality would be validated in all its meanings if it ceased to be taken as a defunct form and were made to *occur in actual thinking*. All that is necessary in each case to give it a real meaning is that it should have been generated by a real question and have a bearing on a real doubt in a real context. According as the question our syllogism is designed to test, *i.e.* its actual meaning, is whether Smith is as other men, whether the definition of 'man' is correct, or whether a 'case' of a 'kind' necessarily has a certain attribute because the 'kind' in general has it, the *words* of the syllogism have to be interpreted differently. But under none of these interpretations does the real argument either become otiose or beg the question.

(1) Taking it in extension, 'all men are mortal' means 'all those whose death has been recorded' and does *not* include Smith (who is still alive), nor, therefore, beg the question. 'Smith' here stands for a new case *which has not been examined*, and it is of course always thinkable that he should prove discrepant. There is always a question whether a rule which has been derived from experience of past cases will bear extension to a new case. And there is also raised the general question, Why should the future resemble the past? which has posed all philosophers ever since it was first put to them by Hume.

(2) The same doubt about the conformity of the 'case' to its supposed 'law' also underlies the interpretation of the major premiss as a definition. Clearly, if it is part of the definition of 'man' to be mortal, then, if a 'man' appears whose mortality is doubtful, *e.g.* a 'ghost' called by its 'medium' 'Smith,' his humanity also is disputable. But so also is the correctness of the definition of 'man.' After all, definitions are meant to apply to cases, and if they do not they become useless and are ultimately discarded as

mistaken. So if cases multiplied in our experience of 'men' who were also 'ghosts,' a question would arise of whether it was *more convenient* to deny them the name of 'man' because of their annoying lack of an 'essential' human attribute, or to call men 'men' irrespective of the liability to die. And the *raising* of this question would be the real meaning of the syllogism.

(3) Similarly, the third interpretation presupposes a real question whether and how far the general character of a 'kind' can be taken as a guarantee that each of its members will be found on any particular occasion to possess that character in full. This is a very real and most important question for science, and it is inexcusable that logic should ignore it, or try to evade it, by pointing to the merely verbal fact that after all it is *called* a 'case' of some 'kind.' It is, then, always a real doubt which makes sense, and is the sense, of the argument that Smith must be mortal because he is human.

In all these cases, therefore, it is so far from true that the syllogism demands absolutely true and certain premisses that it actually becomes formally invalid if the reasoning is supposed to proceed from such. When we dig below the verbal form, every real syllogism (as opposed to the defunct form of words which Formal Logic substitutes for the real reasoning) is the expression of an *experiment* which tests the consistency of our knowledge. The conclusion states what on the strength of previous knowledge we had a right to expect; but it has to be confirmed in fact. And if we had not felt it to be doubtful, we should not have reasoned. Actually, therefore, the syllogism does not beg, but *raises* a question. And this perhaps reveals the deepest difference between the different types of logic. For while Formal Logic seems to hold that all questions may be begged with impunity, a critical study of actual thinking inclines us rather to the conviction that all questions, or at all events all logical questions, should be raised.

§ 11. *Non-syllogistic Forms*

The main struggle with the Formal analysis of the Syllogism is over. It is clear that it makes nonsense of the Syllogism, alike as an instrument of thought and as a test of reasoning. If the Formal account deserves to be called even 'an *ex post facto* analysis of a valid reasoning,' it must at least be added that it 'analyses' the Syllogism into what can neither be reasoning nor valid nor significant. Once this is clearly grasped the questions that remain become subsidiary, and may be treated briefly as corollaries.

For example, there is a much-debated question among logicians as to the 'validity' of certain non-syllogistic forms, and as to whether they should be recognized as such or reduced to syllogisms. The discussion will not be found to throw much fresh light on anything but the mental confusion which Formal Logic naturally engenders.

It is argued in the first place that syllogistic reasoning is properly confined to terms standing in the relation of subject and predicate, and that there are other relations which are not 'naturally' thus interpreted but nevertheless give rise to conclusions just as cogent as those of the Syllogism. Consider for example, (1) A is equal to B, B is equal to C, ∴ A is equal to C; (2) A is east of B, B is east of C, ∴ A is east of C; (3) A is earlier than B, B is earlier than C, ∴ A is earlier than C; (4) A is as bright as (or in tune with) B, B is as bright as (or in tune with) C, ∴ A is as bright as (or in tune with) C; (5) A is brother to B, B is brother to C, ∴ A is brother to C. The relations which mediate these inferences are various, but none of them are syllogisms. Yet how can the truth of their conclusions be denied?

Of course the strictest sect of Formal logicians will have none of them. They will reply: 'Certainly your examples show that we often neglect to reason in syllogistic forms. But that, of course, we have always admitted and deplored. That was just why we were so

insistent that the "naturally" slipshod reasonings of common men should be formulated exactly in syllogisms. And though these curiosities of yours are not syllogisms, they can all be turned into such with ease. Thus (1) becomes "things which are equal to equals are equal (Euclid); now A and C are things equal to an equal (B), ∴ A and C are equal." You may call this clumsy if you like, and less obvious than the original reasoning. But this sort of objection may often be raised to scientific accuracy, and does not intimidate us. Moreover, we are astounded that *you* should urge it. For have you not until now been good Formal logicians, abjuring the study, and despising the practices, of human minds, and keeping your logic untainted by psychology? Yet what are your objections to clumsiness and obscurity but appeals to psychological prejudices? We are thoroughly ashamed of you, and grieved that after so long upholding the banner of pure thought you should exhibit so hideous and illogical a backsliding.

'We beg to point out to you furthermore that your "non-syllogistic forms" are not *formally* valid, but manifestly depend on material knowledge. They really rely on such empirical relations as the order of things in space and time, and the facts of human relationship. These relations are very familiar, and so the inferences are quite easy and evident. But this again is psychology and not logic. And that it is not their *form* which validates them is shown by the fact that other reasonings in precisely the same forms are not valid at all. If we were to argue, for example, "A was contemporary with B, B with C, therefore A with C," or "A is cousin (or friend) to B, B is cousin (or friend) to C, therefore A is cousin (or friend) to C," the inference would not hold.'

The human inconsistencies of Formal logicians do not concern us, for we have consistently maintained that Formal Logic was nothing if it was not consistent, and that it must always be taken in its best, *i.e.* most consistent, form. But we may proceed to point out that the recognition of non-syllogistic forms of valid inference,

whether or not it can formally be justified, in no way removes the exceptions we have taken to the whole Formal treatment of Inference. It was the Formal notion of valid inference as such that we objected to as an unintelligible and unmeaning caricature of actual thinking. And so we find that these new 'forms' are also open to objections. Not only do they involve just the same difficulties when we try to account formally for their formation (cf. § 5), but they are just as much exposed to 'Sidgwick's ambiguity' (§ 6), and just as liable to break down in the application. Lastly, if they are taken as 'forms,' like the Syllogism, they became tautologies or beggings of the question.

Thus, though in the abstract it is undeniable that 'things equal to the same thing are equal to each other,' because that is the definition of 'equality,' it is not necessarily true in the application. Psychologists have ingeniously laboured to show us that though A and B and also B and C may be so equal that no human sense and no human instrument can detect any difference, there may yet be a perceptible difference when A and C are directly compared. 'A is east of B, B is east of C, ∴ A is east of C' may be logically true on the face of it, but it is not necessarily true on the face of the earth. No. 3 is not necessarily true, if the beings who judge whether 'A is earlier than C' have a different 'time-span' from those who discriminated the order of A and B and of B and C; and No. 4 has the same flaw as No. 1. No. 5 is positively false if 'brother' be taken to include half-brother, and so forth in all the cases that might be quoted.

To show that these forms do not escape the charge of tautology or *petitio*, it should be sufficient to point out that their reasoning may always be reduced to a syllogistic form. Thus 'A = B, B = C, ∴ A = C' reduces to 'all things which = B = C, A = B, ∴ A = C.' It would be strange indeed if so slight an alteration in the form could turn a bad argument into a good one. But we may also point out directly that the original form

presupposes either (1) that we have discovered that there is such a thing as 'equality' by examining the cases like A, B, C, and that the argument really raises (or begs) the question whether A, B, and C are like enough to be taken as 'equal'; or (2) that we have defined it so that the 'conclusion' follows (which is in this case the favourite retort, for when A does *not* in fact = C, we say, then A and B and B and C *were* not 'equal'); or (3) we have ourselves made A, B, and C 'equal' by abstracting from their differences.

Taken as forms, therefore, these reasonings are just as vulnerable as the Syllogism. Valid reasoning may appear in these forms just as they may appear as syllogisms, but they are not valid *because of their form.* No reasoning is valid for any other but 'material' reasons, and there are no means of establishing its Formal truth apart from its truth in point of fact.

§ 12. *The Argument from Particulars*

The question whether it is possible (or legitimate) to reason from 'Particulars' is also one which has greatly exercised logicians. It is urged, on the one hand, that men habitually argue straight from facts to facts without formulating any general rule, and on the other, that the particulars they use are never mere particulars, but always conceived as cases of some 'universal,' and that this alone renders the process logically respectable (or even psychologically possible?).

Both parties seem to confuse the issue. Is the question whether we *do* argue from 'facts' to 'facts' or whether we *ought* to? Or is it whether 'facts' are 'mere particulars' or 'universals'? At any rate, if it is a fact that we often argue from facts to facts, it is a fact of *psychology.* How then is this, as such, a proof that it is a procedure logically to be recommended? Yet if it is a psychological fact, how can it be proved not to occur by the fact that it is logically reprehensible? The argument from particulars should be shown to be

psychologically impossible, and then its logical claims, whatever they are, would vanish of themselves. Or both parties should at least consider the possibility that this mode of reasoning plays a part in the formation of our beliefs *without* being logically 'valid.' Again, the disputants do not seem to mean the same things by their terms. The 'facts' of the one are not the 'mere particulars' of the other, and when the others call 'facts' 'universals' because they involve abstraction, they do not surely mean that they are not to be distinguished from other universals. Again, the alternatives they offer do not seem to be exhaustive. It may be that we neither argue from *mere* facts nor from mere universals, but from what we may regard as both or neither, and that neither party has conceived aright the nature of reasoning.

These possibilities seem worth developing. We certainly seem often to reason from particular 'facts,' and yet we probably take them as 'cases' of an unexpressed rule. Again, we often reason from rules, but yet we conceive them as intrinsically related to cases. If, that is, a rule did not apply to any case, it would be regarded as false (or properly 'unmeaning'). Thus the 'cases' always seem to be cases *of* a rule, and the 'rules' to be rules *for* cases. The 'facts' or 'cases' and the 'universals' or 'rules' seem to be relative to each other, and it follows that the antithesis between them is a mistaken one.

And this will seem quite natural if we inquire how we ever came to formulate the cases and the rules. Both are then seen to arise from the same sort of operation on the flux of experiences. We *select* both our 'facts' and our 'rules,' and in both cases take a risk that our selection has not been a good one, but has missed the relevant, and included the irrelevant, for our cognitive purpose. It is natural, therefore, that 'facts' and 'laws' should play into each other's hands. Neither are the 'facts' so absolute as the one, nor are the 'laws' so independent of the facts as the other, party thought.

But if we conceive their relation thus, it certainly does not seem obvious why we should not argue from so-called 'particulars' or 'facts.' The 'facts' we argue from are understood to be 'cases' of laws; so are the 'facts' we argue to. But why should those 'laws' be stated? They can, of course, be stated on demand; but how does this add to the value of the reasoning? If we argue directly from the cases, we argue by analogy, and if it is to be a good analogy the cases must be relevant; if we formulate a rule, we merely state the ground of this same analogy. The analogy does not become better by being formulated as a universal rule, nor is its risk diminished. For after all the rule was drawn from a study of cases, and it can never in advance quite guarantee its application to the next case (§ 10). Whoever then fails to see, or to trust, the analogy between the two cases, may equally repudiate the rule with its assumption that the cases are 'identical'; whoever has faith in the rule may just as well trust to the analogy between the cases, if he sees it. Indeed, it is often psychologically much easier to see analogies than to formulate rules, and most of our rules have, like the Common Law of England, probably originated in such perceptions. Also, to abstain from formulating the rule will check the premature hardening of the rule. To assert dogmatically, therefore, that we must not argue from fact to fact, is simply to recur to the old delusion that the *form* of a reasoning as such can make it good; whereas all it can do is to reveal its nakedness, and to show where (if anywhere) its claim may be attacked.

§ 13. *The Syllogistic Dicta*

A similar treatment will dispose also of the vexed question about the value of the syllogistic *Dicta*. Aristotle believed that it was somehow an additional protection to the validity of syllogistic reasoning if it were represented as dependent on a universal principle. Hence originated the *Dictum de Omni et Nullo*, and the

alternatives and disputes which it provoked. To the *Dictum*, which was usually formulated to the effect that 'whatever is predicated of a whole is predicated of any part of it,' it was objected (1) that it only applied to reasonings in extension, and (2) that it only applied to reasonings in the First Figure. For the first defect the Formal remedy appeared to be more *Dicta*—why not manufacture as many as science might require, *Dicta* for reasonings in intension and for each Figure? So Formal Logic buttressed itself with further technicalities, the *Nota Notae* for reasonings in intension, and *Dicta de Diverso*, *de Exemplo*, and *de Reciproco* for the second, third, and fourth Figures, etc. Of the second defect Aristotle's cure was (as we saw in Chap. XV, § 4) 'Reduction'; his successors made various attempts to represent the 'imperfect' Figures as independent, and to show that certain reasonings were 'naturally' (*i.e.* psychologically) formulated in them.

But the fundamental questions were never raised, whether *any* Dictum was psychologically 'natural,' or logically necessary and valuable at all. For to have raised these would have been to raise the question whether the value of an argument depended on its form or on its 'matter.' And this would have been too revolutionary.

Yet it may plainly be contended (1) that if the formal validity of an argument is not apparent in itself, it is not rendered more apparent by being restated, more obscurely and cumbrously, in a 'dictum,' and (2) that it is quite possible and reasonable to admit the argument in a particular case, without, therefore, consenting to consider or admit it as a universal rule.

(1) If any one chooses, like the late 'Lewis Carroll,' to be heretical enough about syllogistic forms to deny that because he has accepted the premisses of a formal syllogism he must also accept the conclusion,[1] what means has Formal Logic to compel him? His position can only be assailed with another formal syllogism, which he can,

[1] Cf. *Mind*, N.S., iv, p. 278.

of course, consistently deny also; while to suppose that he must surrender to any *dictum*, which merely enunciates the principle he is contesting, in a more general form, is clearly too naïve. Nor can a Formal logician appeal to his feelings as a man and brother not to be so unkind. For this would be another disgraceful lapse into psychology, unworthy of the lofty detachment of Formal Logic.

(2) Commoner perhaps, but quite as unanswerable, would be the second sort of objector. It is certainly easier psychologically to see that if all men are mortal any man must be mortal, than that 'whatever falls under the condition of a rule falls under the rule,' or even to grasp that the two arguments are meant to mean the same thing. But would any one who admitted the first necessarily be bound to admit the second, or even reasonably do so? Would not a critical and cautious mind reasonably balk at a request to commit itself to a sweeping principle of unknown application, merely because the principle had seemed to it to work in a particular case? Is it not surely more reasonable to inquire first what *other* cases the principle is intended to cover, and whether there may not be discovered limits to its applicability?

In point of fact the objector would be quite right. For the question of the validity of a principle can never be wholly dissevered from that of its application. It is never valid merely as a 'form.' The form may always break down under the strain of application to a fresh case (§ 6). For the rule must always be extended to a 'case' of which the conformity is *not certain*, if the argument is to be significant (§ 10). Hence we must always be prepared to admit, after the experiment, that the rule 'did not really apply,' or that the case 'was not really a case.' To ask us to surrender this right of correcting the errors in our rules and predictions in the light of experience, which is so necessary to the actual use of syllogistic reasoning, is to ask us to cease to be critical. The plea that by admitting a principle in one

case we have admitted it in all, is an attempt to cheat us out of a recognition that circumstances alter cases and that cases must be considered on their own merits. Formal Logic, of course, does not mean to be dishonest when it thus asks us to pledge ourselves in advance to a multitude of dubious applications; it only wants to simplify. But its 'simplification' is only plausible so long as no attempt is made to go beyond verbal forms into the meaning of actual reasoning. The importance attached to the syllogistic *Dicta* is thus a measure of the extent to which it is desired to reduce reasoning to unmeaning 'forms.'

§ 14. *Conclusion*

It is time to sum up our results. The question throughout has been whether the Syllogism should be regarded as a pure form of valid inference, or as an instrument of actual reasoning. The result of our inquiry seems pretty decisive. The notion of valid inference has evaporated (§§ 8-9), and in its Formal sense the Syllogism is formally invalid and actually unworkable (§ 10). Thus it has resulted from the formal interpretation of its function (1) that the Syllogism could not itself secure the truth of its premisses, but could only demand them, and that the truth of all its conclusions was in consequence conditional. (2) The 'necessity of thought,' which it professed to display, lay merely in an *ex post facto* reflection on the completed form, and did not exist in the actual reasoning. (3) The actual construction of syllogisms had to be declared extra-logical, because (4) the notion of valid inference was void and Inference as such was extra-logical. (5) Even intrinsically, no conclusion of a syllogism need be admitted as a matter of form, because it was always possible to accuse its Middle of ambiguity, and to this charge no formal answer could be given. (6) Formally the Syllogism was either a *Petitio Principii* or a tautology, according as it did, or did not, claim novelty for its conclusion. (7) The non-syllogistic forms were no

better than the syllogistic. (8) Neither the passage through a universal rule nor the appeal to universal *Dicta* added anything to the real force of an argument.

In the end, therefore, Formal Logic can be said to vindicate the theoretic function of the Syllogism as little as to leave it a wide sphere of practical usefulness. Its account of the Syllogism no more makes it an '*ex post facto* analysis of a valid argument' than it is an applicable method of drawing conclusions. For it is not a *correct* analysis of any actual reasoning. As an analysis it commits the double atrocity of both suppressing the true account of reasoning and of offering in its stead another which is wholly fictitious and false. What does, in fact, generate and hold together any actual inference is the personality of the man who draws it in a particular context, and the nature of his intelligence, interests, purposes, and ends ; its value is determined partly by its relevance to these, partly by the social impression it makes on others whose thinking is similarly personal. But all these actual connexions of thought Formal Logic, though it cannot deny their existence, feels bound to ignore on principle. Lest, however, the drawing of inferences should, in consequence, become wholly unintelligible, it proceeds to substitute for the real connexions 'logical' connexions, which could not possibly draw the inference and whose efficacy is wholly imaginary. It was shown in § 5 that the 'logical necessity' of a syllogism was never a psychic fact, and only became visible in the deceptive light of logical reflection, after the reasoning was over, and by dint of abstracting from the real process of thought. It is, in fact, an illusion which inheres only in the *words* of the inference, and can have a meaning only for those who accept the (potential) meaning of words as sufficient to satisfy the ambitions of Logic. But with real reasons and real meaning Logic has, on this interpretation, nothing whatever to do.

On the second theory the Syllogism, in order to acquire real meaning, has to sacrifice many ancient claims. It can no longer pretend either (1) to yield absolute

certainty and to relieve the mind from further questionings ; or (2) to compel assent ; or (3) to account for the course of thought ; or (4) to 'demonstrate' conclusions with 'absolute' certainty ; or (5) to be undeniable in virtue of its mere form ; or (6) to be the only form in actual use ; or (7) that the use of forms makes an argument *ipso facto* valid, because (8) it is no longer tenable to think that mere forms have any meaning.

But after renouncing all these claims the Syllogism still retains an important critical function. All arguments can be put in syllogistic form, with more or less manipulation. Now, to put an argument in syllogistic form is to strip it bare for logical inspection. We can then see where its weak points must lie, if it has any, and consider whether there is reason to believe that it is actually (*i.e.* materially) weak at those points. We thereby learn where and for what the argument should be tested further. No one who realizes how difficult it is to test a claim to truth will underrate the importance of this function, or repine that the notions of 'formal truth' and 'formal proof' should have turned out to be wholly illusory. Nor will any one who realizes that real thinking presupposes real doubting marvel at the paradox that the Syllogism, which was invented to set doubts at rest, should, in fact, bring out what points are doubtful.

CHAPTER XVII

HYPOTHETICAL AND DISJUNCTIVE FORMS

§ 1. *The Relation of Conditional Reasoning to Syllogism*

IN elaborating the Forms of Syllogism the ordinary logician commonly conceives himself to have achieved his aim of formulating the ideal of thought. He tends in consequence to regard the occurrence of reasonings which appear to make use of hypothetical and disjunctive judgments as quite a secondary fact, and to treat their forms as a sort of appendix to the Syllogism. For the purpose of reasoning is tacitly supposed to be the making of a dogmatic categorical affirmation which possesses a logical necessity from which there is no appeal. Now, as the hypothetical and disjunctive reasonings show by their very form that to begin with, at any rate, they fall short of this ideal, it seems imperative to prove their 'validity' by converting them into the categorical form by various verbal devices, such as the transformation of 'if A is B, B is C,' into 'the case of A's being B is the case of B's being C.' On the other hand, the better sort of Formal logicians, confusing the logical problem of a judgment's hypothetical form with the ontological problem of its application to reality, *i.e.* confusing logical and real validity, and dimly perceiving that the latter must in a significant judgment always be open to a certain doubt, are wont to debate rather whether 'truly scientific' universal propositions should not be interpreted as hypotheticals, and whether hypothetical and disjunctive judgments do not rank epistemologically higher than the simple categorical

judgment, because they are more clearly expressive of necessities of thought.

To us neither of these attitudes will seem satisfactory. For we have abandoned the idea that the Syllogism is either able or intended to be a machine for yielding categorical certainty, nor do we regard an air of dogmatic assurance as the end-all and be-all of true science. Dogmatic certainty is the end of science, precisely in the sense in which death is the end of life. The very life of science and the source of its infinite progress depends on the fact that its 'truths' are never so 'absolutely' certain that it may not strive to improve them. It must always value a living truth above a dead certainty, and whether the forms used are 'categorical' or 'hypothetical' the meaning to be expressed is always relative to a doubt or a dispute or an alternative. If, then, the real purpose and use of the Syllogism is to test doubtful cases, its categorical form ceases to seem a ground for claiming superiority, and is really irrelevant. If all reasoning is 'hypothetical' in the sense of being tentative, a difference in form ceases to be an infallible index to a difference in meaning. It is no longer necessary to hold that there must be more than a verbal difference behind the forms 'if two things are equal to the same thing they are equal to each other' and 'all things equal to the same thing are equal to each other.' Neither, on the other hand, shall we feel it our duty to blur the distinctions, which are found in the actual meaning, in the opposite way. The state of mind which naturally expresses itself as a categorical assertion is different from that which expresses itself hypothetically, and we shall insist that the psychological questions as to an assertor's state of mind can and must be distinguished from ontological questions about the real validity of his assertions. And we shall as usual reproach both parties with a Formalism which is too superficial and devoid of psychological subtlety to penetrate to the real meaning of the reasoning, and to express its actual varieties, or even to 'analyse' adequately the forms themselves.

§ 2. *Hypothetical Syllogisms*

Hypothetical reasonings are classified under two forms, (1) the *Modus Ponens*, or 'mood that posits' the antecedent, and is *constructive*, and (2) the *Modus Tollens*, which sublates the consequence, and is *destructive*. In both the 'major premiss' is the same and alone hypothetical, and states the condition or *Antecedent* from which the *Consequent* follows. The 'minor premiss' is categorical (if a categorical conclusion is to be drawn) in both, and affirms the antecedent in the *Modus Ponens*, and denies the consequent in the *Modus Tollens*. The quality of the conclusion is the same as that of the minor.

Thus we get—

(1) If A is B, it is C,	*or* If A is B, C is D,	*or* If A is not B, it is not C,
now A is B	now A is B	now A is not B
∴ A is C.	∴ C is D.	∴ A is not C.
(2) If A is B, it is C,	*or* If A is B, C is D,	*or* If A is not B, it is not C,
now A is not C	now C is not D	now it is untrue that A is not C
∴ A is not B.	∴ A is not B.	∴ it is untrue that A is not B.

Clearly, then, either the Antecedent is affirmed or the Consequent is denied. The opposite procedure is held to be fallacious, viz. either to *affirm the Consequent* or to *deny the Antecedent*. The reason given is that in 'if A is B, C is D,' the Antecedent is not said to be the *sole* condition of the truth of the Consequent. Hence the Consequent may occur on other grounds; *e.g.* 'If you hang the dog he dies,' does not imply that the dog may not be got rid of in other ways. Similarly, because the Antecedent gives a false reason, it does not follow that the Consequent will not ensue. From the truth that 'if a dog is beaten he will howl' it does not follow that if he is not beaten he will not howl. We cannot infer, in short, from 'if A is B, C is D' that 'if C is D, A is B.' In other words, the relation is not reciprocal.

By converting the reasonings into categorical form they may be shown to be analogous to syllogistic fallacies. For whereas affirming the Antecedent reduces to a syllogism in *Barbara*, and denying the Consequent

to one in *Camestres*, affirming the Consequent produces an 'Undistributed Middle,' and denying the Antecedent an 'Illicit Process of the Major.'

The case of A's being B is a case of C's being D,
This is a case of C's being D
∴ This is a case of A's being B.

The case of A's being B is a case of C's being D,
This is not a case of A's being B
∴ This is not a case of C's being D.

§ 3. *Disjunctive Syllogisms*

A disjunctive syllogism is defined as consisting of a disjunctive major premiss, a categorical minor, and a categorical conclusion. Two 'valid' moods are recognized, viz. the *Modus Tollendo Ponens* and the *Modus Ponendo Tollens*, but of each several forms are admissible. Thus—

(1) A is either B or C,
It is not C (*or* not B)
∴ It is B (*or* not C).

(2) Either A is B or C is D,
C is not D (*or* A is not B)
∴ A is B (*or* C is D).

(3) Either A or B is C,
B is not C (*or* A is not)
∴ A is C (or B is).

(4) A either is B or it is not C,
A is not B
∴ A is not C.

(5) A either is not B or it is not C,
It is untrue that A is not B
∴ A is not C.

They would all be counted as cases of *Tollendo Ponens*, because the denial of the one alternative leads to the assertion of the other. Similarly the following are cases of *Modus Ponendo Tollens*.

(1) A is either B or C,
A is B (*or* C)
∴ A is not C (*or* B).

(2) Either A is B or C is D,
A is B (or C is D)
∴ C is not D (or A is not B).

(3) Either A or B is C,
A is C (*or* B is)
∴ B is not C (*or* A is not).

(4) A either is B or it is not C,
A is B
∴ it is untrue that it is not C.

(5) A either is not B or it is not C,
A is not B
∴ it is untrue that it is not C.

It is manifest that in both these disjunctive Moods the cogency of the reasoning depends on the assumption that the alternatives expressed in the disjunction are strictly exclusive. In practice this is the real difficulty of disjunctive reasoning, because it so often turns out that other alternatives have been overlooked; but Formal Logic simply postulates this ideal disjunction, without regard for the fact that '*either . . . or*' are frequently not *intended* to be strict alternatives, and that sometimes this vitiates the disjunctive argument, and sometimes strengthens it. For instance, if it is argued that 'if he is either a fool or a knave, he will do this,' then if he is *both* fool *and* knave, he may do this *a fortiori*.

§ 4. *The Dilemma*

The practical difficulties in the use of these forms recur in the *Dilemma*, which is the prettiest and dialectically the most effective form of conditional Syllogism. It consists in driving a disputant from a condition he has admitted to a choice between one of two alternatives (the 'horns' of the dilemma), both of which are repugnant to him. Technically this form is said to be composed of a compound hypothetical major premiss, a disjunctive minor, and a disjunctive (or categorical) conclusion. There are a number of varieties, *constructive* or *destructive*, *simple* or *complex*, but there is no new principle involved in them. The following examples will symbolize the Complex and the Simple Constructive Dilemmas.

(1) If A is B, C is D, and if E is F, G is H,
But either A is B or E is F
∴ either C is D or G is H.

(2) If A is B, C is D, and if E is F, C is D,
But either A is B or E is F
∴ either way C is D.

The weak point in the structure of dilemmas is usually in the disjunction. If alternatives have been

overlooked, a counter-dilemma can be constructed wherewith to rebut the first, as is best illustrated in the classical tale of Protagoras and Euathlus. Euathlus had promised to pay half of the fee he owed to Protagoras for his instructions in the noble art of self-defence in the Athenian law-courts, on winning his first case; but as he merely wished to be prepared for attacks, he did not for some time give Protagoras an opportunity of claiming his fee. Protagoras, growing impatient and suspicious, finally sued him, and expected to win with a Simple Constructive Dilemma, arguing that if the court decided in his favour Euathlus would have to pay by order of the court; if the court decided against him, Euathlus would have to pay under the agreement, but that the court would either decide for him or against, and therefore in either case Euathlus would have to pay. His pupil, however, rebutted him with a retort that he would not have to pay, either under the agreement if he lost his case, or by order of the court if he won it, and the court, with a truly Greek delight in dialectics, proved them both wrong by postponing judgment for a hundred years.[1]

§ 5. *Criticism*

(1) We may begin our criticism of these Formal doctrines by reverting to the question mooted in § 1 as to whether hypothetical reasoning can properly be rendered in the categorical form. Now it is evident in the first place that the verbal transformation of 'if' into 'the case of' cannot be supposed to alter the real nature of the reasoning. A little reflection on the psychological facts, moreover, will show that not only is there a difference between hypothetical and categorical reasoning, but that there are *far more* differences than Formal Logic takes into account. It is theoretically possible to go on developing hypothetical consequences indefinitely,

[1] Theoretically this was a third alternative to a decision in favour of either party, though practically it was a decision in favour of Euathlus. In equity, of course, Protagoras ought to have been paid. He could, however, have got his money by first bringing a frivolous action against Euathlus and losing it.

arguing, *e.g.*, that if A is B, C is D, and if C is D, E is F, and that, therefore, if A is B, E is F, and if E is F, G is H, etc. ; but even the most assiduous spinner of hypotheses would at last grow impatient and desire to come to something that could be affirmed categorically and found to be true or false, if it were only to test the value of his theorizing. It follows, therefore, that a real psychical difference is (or may be) blurred in reducing hypotheticals to categorical form.

(2) The real objection to the Formal hypothetical is rather that it is itself 'ambiguous' (*i.e.* subject to plurality of senses), and therefore blurs further distinctions which are often clearly intended and understood in actual reasoning, and are indeed familiar enough to have won recognition in language. But here we must distinguish. (*a*) The hypothetical form may be used to express merely the logical dependence of consequence on ground without any intention of expressing any doubt—doubt actually felt by the assertor. 'If you are bitten by a cobra, you die,' may merely convey scientific information about the venom of a species of snake. But (*b*) it is likewise possible that a 'hypothetical' may be intended to express a doubt. 'If I have been bitten by a cobra, I shall die,' may be an expression of acute agony. Again, it is perfectly possible to express varying intensities of doubt. The form itself shows, *e.g.*, differences in the extent and character of the doubt between 'if A is B it is C,' 'if A is B it will (or would) be C,' 'if A were B it would be C,' 'if A had been B it would have been C,' etc. Clearly, if the dogmatic interest had not so completely carried the day against the psychological, it would have been possible to study these forms, even Formally.

(3) It deserves to be recorded to the credit of Formal Logic that it should have recognized as a 'fallacy' the tendency to take as reciprocal the relation of ground and consequence, and to argue that because a certain consequence was found a certain ground for it must be there, or that because a certain ground was illusory a

certain consequence could not occur. But unfortunately the Formal theory of Induction at once proceeds laboriously to undo this good effect by arguing that the *true* 'cause' must always be conceived to be in reciprocal relation with its effect (Chap. XX, §§ 7, 9).

(4) Similarly it seems vain to insist that disjunctions must be complete, and that 'A is either B or C' should always have '*or both or neither*' added to it, if we are not to be warned that in fact the disjunctions we argue from are never absolute and are taken to be adequate for the purpose of an inference at our peril, nor to be allowed to confess that we are often enough quite aware of this and do not mean them to be absolute.

(5) This last fact, it may be pointed out, renders the Formal convention that 'either . . . or' shall mean strict exclusion highly arbitrary.

(6) Just as there was a question whether the hypothetical could be reduced to categorical form, so it may be debated whether the whole sense of a disjunctive can be rendered in hypothetical form. 'A is either B or C' may be 'analysed' into 'if A is B, it is not C; if A is C, it is not B; if A is not B, it is C; if A is not C, it is B.' But this assemblage of hypotheticals seems to have eliminated the categorical assertion of a choice between B and C altogether.

We may conclude, then, that the Formal account of Conditional reasoning exhibits no point where its doctrine is more, and several where it is considerably less, than verbal.

CHAPTER XVIII

THE PROBLEM OF INDUCTION

§ 1. *The Origins of the Problem of Induction*

THE problem of Induction forces itself upon the attention of the Formal logician in two distinct ways, which afterwards turn out to be closely connected.

(1) We noted in Chap. XVI, § 4, that the syllogistic form never guaranteed the truth of the premisses of any argument, and suggested that, therefore, the logician had *no right to assume* that his premisses were ever materially true, and ought to admit that the truth of his conclusions was always more or less hypothetical and questionable. Unless, therefore, the logician is willing to admit also that he has *no need* to assume material truth, it is plain that there arises a logical problem of pressing importance, as to how true premisses are to be arrived at in point of fact. The logician's name for what he conceives to be the solution of this problem is *Induction.*

(2) A second source of Induction is to be found in the problem of reasoning from 'facts.' This too is indisputably a real problem, although logicians have differed greatly in their manner of conceiving the nature and value of 'fact' and its relation to 'theory' or 'law.' For it seems undeniable that men do somehow habitually reason from, and about, what they are pleased to call 'facts.' Hence the logician felt bound to consider, criticize, and regulate (or condemn) the practice.

These two sources of Inductive Logic were, moreover, brought into connexion by the fact that upon one of the

two traditional theories of reasoning about facts the true premisses, which syllogistic proof demanded, were to be ultimately secured to it by generalization from 'facts,' whereas the other, though it denied that the validity of ultimate principles rested on correct observation of facts, yet asserted that it was only in a process of meditation upon facts that the 'self-evident' truth of principles could be grasped by human intelligence. In addition to these two traditional ways of getting premisses for the Syllogism there has recently been put forward a view that ultimate principles are essentially *postulates*, based on 'facts,' though not *proved*, but only suggested, by them.

We get then *two* questions which underlie the Theory of Induction:

(*a*) *How are the principles which form the premisses of syllogistic reasoning ultimately to be obtained?*

To this there are three answers which have to be examined, viz. (1) by *Intuition*, (2) by *Generalization*, (3) by *Postulation*.

(*b*) *How are we to reason from facts?*

But before we go into these questions, we have to realize what a very embarrassing defect springs up in the Syllogism so soon as an attempt is made to use it in actual reasoning. For once it ceases to be regarded as a mere form and is brought into the context of an argument, it is reduced to an almost desperate position by the question, *What proof have you of the truth of your premisses?*

§ 2. *Does Syllogistic Proof involve an Infinite Regress?*

(1) Dialectically the situation seems hopeless, as we might have expected from Chap. XVI, §§ 5 and 13. No disputant need ever capitulate before the most imposing syllogism. For the wretched thing always has two feet of clay. It stands on its premisses, and to upset it, it is enough to question one of them. 'Certainly,' he can say, 'your syllogism is quite crushing if its premisses are sound. But are they? I notice that

you have not proved, but only asserted them, and expected me to admit them. I am not contentious, but should like to see you prove them; but to show that I am only desirous of understanding the true nature of syllogistic reasoning, I will only ask you to prove your major.' This forces the syllogizer to propound another syllogism in order to prove his major premiss, only to find that his new major is once more questioned, and he is called upon to 'prove *that*.' The process can be carried on until the ingenuity and the temper of the syllogizer are exhausted, and it is usually before the fourth repetition of 'prove *that*' that even the sweetest-natured logician lapses into language which cannot possibly be regarded as logically relevant.

Another and in some ways more plausible way of playing the same trick on the logician is to assert that his major premiss 'begs the question,' and to repeat this charge whatever ulterior ground he may adduce for it.

Clearly, therefore, syllogistic reasoning is in practice *ex concessis*; and if it is to be used, disputants must agree to accept certain principles as unquestionable and decisive, at least for purposes of the argument.

(2) The difficulty, however, is not merely dialectical. It is in a way inherent in the logical form. For it is after all incidental to the *form* of the Syllogism that it has two premisses, which may be false, and which must be proved true for the conclusion to stand. If, therefore, any doubt is raised, genuinely or perversely, about the truth of the premisses, both premisses must be proved. And this they can only be by two other syllogisms, each of which again has two questionable premisses.

Thus to prove the *two* premisses *four* further true premisses are required, and at the next step eight, and so on *ad infinitum*. The number of true premisses is doubled at each step, and they must always be new ones as well.[1] For if we tried to use one which had already

[1] *E.g.* If we tried to argue (1) all B is C, all A is B, ∴ all A is C, (2) all D is C, all B is D, ∴ all B is C, (3) all D is B, all A is D, ∴ all A is B, 'all D is B' would be an 'invalid' conversion.

been used and questioned, we should clearly be arguing in a circle.

The *form* of the Syllogism, therefore, implies an infinite regress when we try to use it, and this should be where Formal Logic leaves the matter, with the addition perhaps of a warning that this shows how much too sacred forms are to be used. Instead of which Formal Logic has always repudiated this result. It has always here yielded, quite inconsistently, to the temptation of becoming a theory of knowledge, and suggested methods of cutting short the regress.

To declare that our ultimate premisses are 'self-evident' intuitions is one such method. To declare that we must ultimately accept 'facts' is another. But both are arbitrary assertions, unlikely to win assent and unable to extort it.

Nor do either of them realize that the difficulty they attempt to meet really results from an uncriticized assumption as to the nature of real reasoning which they have both in secret made, and which happens to be wrong. It is assumed that 'proof' must always *start from certainty*. From this it follows that the premisses of a demonstration must themselves be certainly true, and the pursuit of this initial truth backwards yields the infinite regress we have been considering.

But what if it be *not* true that to reason we must have certainty? What if reasoning be essentially experimental, a *testing* of *hypothetical* premisses by the truth of a conclusion yet to be observed, an attempt to see whether *experience will confirm* conclusions which have been deduced from assumed premisses of *doubtful* validity? That such is the nature of actual reasoning has already been suggested (Chap. XVI, §§ 10, 14), and it utterly transforms our problem. Instead of an infinite regress, an unending search for elusive 'foundations' which are for ever sinking out of our reach, we get an *infinite progress*, an ever-growing mass of confirmations which *verify* our premisses by the *de facto* truth of the results they have predicted. The Syllogism's *formal* incapacity to yield

'absolute proof' thus turns out to be really a refusal on its part to pander to the monstrous demands of a mistaken conception of knowledge, and to stultify Science by setting any limit to its progress. Moreover, it was precisely its faith in the infinite possibility of progress which led Science to refuse its assent to the Aristotelian ideal of demonstrative knowledge (Chap. XVI, § 4). For clearly, if absolutely certain premisses are neither obtainable nor desirable, and if it is enough that the truth of premisses can be continuously verified by their consequences, why should Science allow itself to be arrested by a theory which begins by postulating the impossible?

§ 3. *Intuition as the Foundation of Induction*

Yet Aristotle knew his business, and made his Formal Logic cohere far better than it has done since. His solution of the problem of Induction has at least the merit of a high degree of consistency. He explicitly assumed that demonstration starts from a limited number of absolutely certain premisses, of which it is true he has omitted to give us a list, and inferred that every science consists of a limited number of truths. He saw that to realize such an ideal the infinite regress of premisses must somehow be stopped.

He stopped it accordingly by positing a special faculty which he regarded as the highest, precisely because it had to confer superior truth upon the ultimate principles of syllogistic demonstration. He called it *Intuitive Reason* (Νοῦς) and confined it to gods and men. Its function was to grasp, immediately and infallibly, the first principles which, though indemonstrable, were more certain than anything deducible from them. Demonstration, therefore, always went back until the premisses consisted of self-evident axioms, and then stopped as a matter of course. A disputant who questioned an indemonstrable axiom was politely told he was 'uneducated.'

In this way Aristotle got a conception of Science as conveniently finite and artistic as his conception of the

spherical cosmos with its divinely-inspired circular motion. But though it was artistic it could hardly be called critical, and 'intuition' is always a dangerous card to play, because it can be played in so many ways. Aristotle's proof of the existence of the faculty he needed was simply dogmatism, and of its 'infallibility' simply verbalism. He simply fell back on his definition of judgment as what was capable of being true-or-false (Chap. VIII, § 4) and inferred that Intuitive Reason, not being a judgment, could not be false.[1] Nor could there be any doubt of its ability to yield principles, for was it not the faculty of principles?

At this point Aristotle was content to leave matters, without attempting either to give a complete list of the principles he believed to be guaranteed by Intuition, or to discriminate between principles which seemed to have this guarantee, but were false, and those which really had it. Had the point been put to him he would, as a true Formal logician, doubtless have been content with an *ex post facto* confession that since the 'intuitive' principle had turned out to be false, it had *not* been guaranteed by infallible 'Reason,' but by some fallible imitation.

But it is clear that a critical Logic must examine the attempt to base proof on intuition more thoroughly. It is clear (1) that if intuition is to be made the criterion of self-evident truth, the deliverances of 'Intuitive Reason' must be strictly discriminated from those of instinctive unreason. It is useless to say that Νοῦς is infallible if you admit that there is a *pseudo*-Νοῦς which is fallible, from which it cannot be discriminated. Now, in point of fact, 'intuitions' are not a monopoly of philosophers. All sorts of people are liable to them and believe in them, geniuses (like Prof. Bergson[2]), ladies, and lunatics being particularly prone to them. The philosopher, therefore, who relies upon intuitions finds himself in very various company, and may be compelled to

[1] There seems to be some confusion in this. For though a 'faculty' is not a judgment, yet it may give rise to judgments; and if these are in fact false, the faculty can hardly be deemed 'infallible.

[2] Not that he means really the same thing by his 'intuition,' or that it deserves censure as uncritical.

call in the aid of a psychiatrist in order to decide which, if any, of these 'intuitions' are sane and sound. For it is quite conceivable that all these intuitions might be insane obsessions, from which human minds could not free themselves, even though they corresponded to nothing in the nature of things and were constantly being refuted by the course of events.

At any rate (2) it is clear that as the criterion yields false results as well as true, it cannot be ultimate.

(3) Nor is it one to yield concordant results, even among philosophers. An exhaustive list of intuitions has never been compiled by any philosopher, and there have been enormous differences of opinion. We have seen in Chap. X how difficult it was to vindicate a meaning even for the most obvious of these principles, the 'laws' of Identity and Contradiction. There is hardly an absurdity for which self-evidence has not been claimed; there is no 'self-evident truth' which has not been disputed. Intuitions have proved false in all the sciences, even in mathematics.[1] Philosophers have tried to tone down the awkwardness of these facts by contending that an 'intuition' need not be known in advance of the truth it guarantees, and that, therefore, a complete list of its intuitions need not be published in advance by any science. This is, of course, to postpone the day of reckoning until the day of the Last Judgment; but it yields no answer to the question how *we* are *now* to discriminate between true 'intuitions' and false, nor does it guarantee any particular intuition we may be interested in alleging.

(4) The truth is that the appeal to Intuition is to a wholly and incurably psychological principle. That a certain proposition strikes me as self-evident and certain and indemonstrable, is a fact about *my* mind. That it strikes others similarly is a number of facts about *their* minds. Even if it could be shown, as it cannot, that it is capable of striking all other human minds, past, present, and to come, similarly, it would still remain a fact of

[1] Prof. H. Poincaré mentions a curious instance. It seemed self-evident that there could be a tangent to every curve, but it was not true (*Science et méthode*, p. 130).

human psychology, and be just as much an empirical fact of observation as any other.[1] In none of these cases is there any proof that therefore it is true. It might still be an illusion incidental to our mind's structure, just as the convergence of distant parallels is an illusion incidental to our eye's structure. And for Formal Logic to base itself on a psychological peculiarity of disputable logical value seems the height of inconsistency.

(5) At any rate logicians ought to see that before they can derive their principles from a faculty of Intuition, they ought to show that this is the *only* way of accounting for them. They make no attempt to do this, and, in point of fact, not only can the facts they rely on be explained otherwise, but the alternative theories can dispose also of the difficulties which confront the intuitionist theory.

§ 4. *Generalization as the Basis of Induction*

The way of arriving at general statements which commends itself most to common-sense is the observation of fact. It is a very familiar process even to the least observant, and it seems a matter of course that if facts enough can be observed, general statements can be formulated. Logicians have always been more or less susceptible to this mode of thinking, and from the first have tried to base thereon an ideal method of reasoning from experience. The 'facts,' when examined exhaustively, were to yield the 'law' which governed them and assured men of the everlasting recurrence of the 'facts' exemplifying the 'law,' and was thus to justify prediction. The only difficulty about the process lay in the observation of sufficient facts; their formulation into laws occurred of itself. Nor was there any difficulty about the facts; facts were facts whatever might befall, the same for every one and to be recognized by all. If only *all* the facts could be properly observed, the problem of

[1] So it is not, in the end, even true that any rationalistic theory of knowledge can avoid dependence upon correct observation of fact.

the Syllogism was solved; for the generalizations which embodied them could not be erroneous and would provide the absolutely certain foundations which the Syllogism needed. Hence arose the logical 'ideal' of an exhaustive and formally complete enumeration of facts or of a 'perfect' induction (Chap. XIX, § 2).

Not even Aristotle quite escaped the fascination of this ideal (as witness his formal conception of Induction), though he did not detect its central difficulty. But it was soon discovered that this difficulty existed. How could one make sure that the enumeration on which the generalization rested was complete? Did it not presuppose complete knowledge of the existing facts, of their past and of their future? And were not all these things impossible? Supposing even that observation had shown that, *e.g.*, nowhere in the stellar universe was there a planet with beings so like ourselves as to be called 'men' who nevertheless did not die, would it be possible to prove in this way that 'all men are mortal'? Would it not be necessary to have equally extensive knowledge of the whole past? And what about the future? By what magic does the logician become the greatest of the prophets? How has he or any other philosopher ever answered Hume's question, 'How do we know that the future will resemble the past?' Surely it is evident that even the most extensive observation of 'facts' never covers more than an infinitesimal fraction of their total number, and that if the validity of our 'laws' rests on such observation, the results must be extremely hazardous.

The attempt, moreover, to escape from the impossible task of examining all the facts by professing a belief in universal laws of nature which uniformly determine the facts seems merely an evasion. For (1) the law is supposed to be itself derived from experience, *i.e.* from the observation of what are supposed to be its cases; but as the examination of the cases can never be assumed to be either exhaustive or correct, observation may always fail to reveal the true law, and the law accepted may be

false. (2) There is, in consequence, no guarantee that what is said to be the law is the law, nor even if it is can it be known to be. (3) Even if the law had been discovered that held for the existing order, there would be no guarantee that the law itself would not change, and consequently no guarantee for the future. Lastly (4) the very belief in the existence of laws would seem to demand justification.

For the roots of the mischief lie still deeper. For the inductive logician, as for common-sense, the conceptions of 'fact' and 'law' seemed too obvious to require explanation. There seemed to be no possible doubt of the independence of facts or the reality of laws. Yet neither facts nor laws seriously pretend to be given independently of the other, or indeed to be given at all. What we take to be the facts of nature depends on what we conceive to be the laws of nature; and conversely, if we decide that certain alleged facts, hitherto discredited, are really facts, we alter our old laws or formulate new ones. Both facts and laws, moreover, have to be extracted from a continuous kaleidoscopic flow of happenings, which alone is given as the material out of which the cosmic order is fashioned. Until we have decided where one 'fact' ceases and another begins, we have nothing that can be viewed as a 'case' of any 'law.' Clearly, then, it is not as simple and easy to generalize 'facts' as the logician supposed, just as the sweet simplicity of trust in intuitions may be betrayed.

§ 5. *Postulation as the Source of Universal Propositions*

Neither intuition, then, nor observation of facts, seems to yield general propositions in a logically defensible way. Yet it can hardly be denied that in practice we often rely both on self-evidence and on facts. Who but a philosopher would ever question the intuitive self-evidence of mathematical truth, or assume that events occur without a 'cause,' or doubt the evidence of his senses? And would these attitudes be persisted in

unless they had somehow justified themselves? Clearly, then, our actual procedure must in some sense be justifiable, and if Logic does not justify it, its own account of the matter becomes suspect.

It may be suspected also that the errors in both these extreme views are the same. They both seem to consider the logical intellect in abstraction from the rest of the man and to ignore the psychological side of his nature. Nor do they seem to suspect that the taking of risks and the need of enterprise and active exertion, which are characteristic of our life, must be reflected also in the functions of our intelligence. So they accept their 'intuitions' and 'facts' as simply given, without inquiry into their genesis; and then find that they seem arbitrary and irrational.[1] But if they would only regard them as gradually evolved through a long intercourse of our intelligence with reality, they might understand both their rationality and their ratification. Their logical value does not depend either on the superficial appearance of their 'forms,' or even on their psychological mode of genesis, but on their past history and past services, and to see this is to see that the questions of origin and of value must be kept distinct, and must diminish the reluctance to admit that there exists a *third* way of obtaining generalizations which is normal in our intelligence. Formal logicians have overlooked it, because it is not the sort of thing they were looking for; it does not claim that its results are valid on their first appearance, and never claims that they are valid in virtue of their form. But it is, nevertheless, the way in which we acquire the universal truths we use.

It is true that we reason from 'facts,' however obtained; it is true also that we cannot reason from *all* the facts, because we never know all the facts. But it is not true that we need to know all the facts in order to reason. So, too, it is true that we reason from 'intuitions' which seem to us (psychologically) certain; but it is not true that they are therefore logically 'proved,'

[1] Cf. Chap. XX, §§ 3, 4.

nor even that we always think so. It is true that we use universal premisses, but not that they are certain when we begin to use them. Nor is it true that in order to acquire truth we must begin by possessing it. It is not true, lastly, that the premisses must prove the conclusion; it is quite possible that the truth of the conclusion may establish the premisses.

The human mind, fortunately, does not require the stupendous certitudes postulated by the older theories. If in order to know anything we must first know that our principles are eternal *a priori* truths, and our facts absolute and immutable, it is painfully clear that knowledge is impossible, because we have not even now such facts and principles. But then we do not need them. All the equipment that we need to start upon the discovery of truth is a willingness to experiment and a willingness to learn. Granting these (and they are by no means common qualities), our experience will supply us with abundance of material. Indeed the chief difficulty will be to *select* the best and most workable from among the multitudinous suggestions and analogies with which the world bombards an *actively inquiring* mind. Fortunately there is abundant time for such selection. It has been going on for ages, and even the lowest organisms are to some extent selective in their reactions to stimulation. The selectiveness of man is enormous and all-pervading, and he is also conscious of it. Is it a wonder, then, that the results of this whole history should have crystallized into 'axioms' which now seem self-evident, and into 'facts' which now seem solid? Yet the logical value of the products which our ordinary thinking now takes for granted is not original but acquired. Nor are they, even now, immutable, or worthy of superstitious reverence; but they are secured against frivolous attacks.

The psychological procedures by which suggestions are utilized and analogies 'recognized' may be classed together under the name of *postulation*. They differ in various respects both in their objects and in the degree of consciousness they involve, but have in common the

fact that they are all spontaneous reactions which go beyond their data and yield something *new* that was not *necessarily* involved in the data. From a Formal point of view, therefore, these processes are always 'arbitrary,' and risky, but this accusation will not daunt those who have realized that an 'arbitrary' choice between alternatives cannot be eliminated even from the most formal reasoning (Chaps. X, § 7, XIV, § 3, XVI, §§ 5, 10). Anything like an adequate description of the varieties of our postulatory procedure, therefore, would have to go deeply into psychology, and would, after all, be wasted upon Formal Logic. We may content ourselves, therefore, with a few illustrations.

When postulation occurs with a clear consciousness of the scientific nature of its aims, the reasoning will be found to run somewhat as follows: 'I have made such and such observations and they *could* be generalized in such and such ways; of these this one would be the most convenient, because the simplest, the most consonant with my prejudices or previous knowledge, or most fertile of suggestions, the most amusing or most directly advantageous, etc. Let me, therefore, try it, and see whether I can make it work.' Accordingly a 'law' is postulated and its 'truth' is tested by the success of the predictions it enables us to make. If such a postulated law is of high generality and usefulness and has been confirmed by much experience, it naturally comes to be regarded as an 'axiomatic' principle, like, *e.g.*, gravitation. Now this means that it becomes to a large extent immune against the further attacks of experience. For we start with so strong a prejudice in its favour that even when 'facts' are recorded which seem incompatible with it, it is more convenient to doubt or explain away the facts. The non-scientific reader can obtain some idea of the strength of such prejudices by asking himself what sort and amount of 'facts' would lead him to doubt and to discard, *e.g.*, his most cherished religious beliefs. In science the resistance to attempts to question 'axiomatic' principles reaches its maximum when the principle has methodo-

logical value as a principle of inquiry. For example, it would never be admitted that an event had happened without a 'cause' so long as it was possible to imagine that an undiscovered cause had been at work, and it is preferable to suppose an error in an experiment or a defect in an instrument rather than to question the indestructibility of matter or the conservation of energy. Such is our endless ingenuity in devising excuses for them, that it is practically impossible to disprove principles which have once been raised to axiomatic rank in any mind, as 'atheists' soon discover when they attack the conception of 'God.'

The only ways of getting rid of an 'axiom' which is suspected of falsity is to prove that it is useless, or not indispensable, or incompatible with other principles which are still more highly valued. It becomes, therefore, very easy for such principles to pass as self-evident and 'absolutely' true. Yet a study of scientific history would often conduct us to a time when a principle was unknown or even regarded as false, and there are usually definite alterations in the facts, or in our knowledge of them, which would lead us to prefer an alternative 'axiom.' Moreover, experience shows, as we might have anticipated, that no degree of psychological self-evidence and no amount of past success really guarantee an axiom completely. After a triumphant reign of over 2000 years the 'axioms' of geometry have turned out to be postulates, which the makers of 'metageometries' can reject and vary at pleasure. The scientific status of the indestructibility of matter has in the last few years been seriously impaired by the discovery of radio-activity. The postulate of causal determination has never overcome the postulate of moral freedom. And the principle of the conservation of energy can be brought into accord with the facts only by setting down to the 'dissipation of energy' whatever amounts are 'apparently' lost—a procedure very like the familiar balancing of accounts by the immoral aid of the item 'sundries.'

Of course, the less consciously a postulate is made the

more easily is it taken as self-evident. Moreover, the great postulates of rationality, such as causation, number, time, self, God, freedom, and immortality, are of enormous antiquity, and the reasons for them are inextricably intertwined with men's deepest emotions. It is almost impossible to dissect them in cold blood, so as to exhibit their logical nature. Even philosophers rarely try to do this, and when they do it makes no difference. The great majority of men will not tolerate the desecration which their examination seems to involve, and gladly grasp at any excuse for leaving them untouched. Is it a wonder, then, that they should continue to be thought of as self-evident?

Similarly there is no psychological difficulty in the transition from 'some' cases to 'all' which a pedant logic feels bounds to censure. So long as the 'cases' examined *feel* numerous and all point in the same direction, it is easy enough to pass to a universal assertion, even though only an infinitesimal fraction of the whole number has been observed. And there is logical reason for the practice. The serious-minded man who argued that 'all the stories in this book are jokes, so then this story is a joke also,' though he did not see it, was not poking fun at the Syllogism. His doubt was real, and therefore he did not really beg the question. As was shown in Chap. XV, § 10, the 'all' we argue *from* does not psychologically include the doubtful case we are arguing *to*. We are experimentally extending our rule to a fresh case which looks analogous to the old cases, and are risking an assertion of their identity; we are therefore more or less aware that the analogy may not hold, and that the 'identity' may fail. And it is precisely because we are thus bringing our syllogism to the test of experience that we argue. Here again, therefore, the process of validating a postulate is quite distinct from, and in a way independent of, our motives for formulating it. The process of formulating a postulate is always volitional, and therefore when viewed with an intellectualist bias seems 'arbitrary,' though it is probably never as

wantonly and randomly arbitrary as intellectualism is wishful to believe; but the process of confirming, validating, or verifying a postulate is always selective and in the main determined by experience of the working of the postulate, and it is in this latter process that the universal truths which are in common use have actually arisen. Thus their past history bestows on our principles such enormous amounts of stability that on the average they are far more powerful than even the best established 'facts,' and when 'facts' conflict with 'principles' it is usually the former that give way.

§ 6. *How is it possible to reason from Facts?*

Indeed, so powerful are postulates that the logician even has great difficulty in discovering a real function for arguments from facts. From a strictly Formal standpoint 'facts' seem to exist merely in order to exemplify 'laws' and to be 'cases' of 'universals,' and all the additional features which they exhibit, such as their plurality, individuality, and non-conformity, seem to be logically impertinence, or worse. For it is their bounden duty to be what they are called, viz. 'cases' of the law. They must conform, therefore, to their law; or else how could we predict them by its aid? If they fail to conform they cease to be truly cases, and become mere particulars which a self-respecting logic cannot recognize. In so far as they are 'mere particulars,' diverging incalculably from their universal types, they become unmeaning and unintelligible.

Yet in so far as they exactly exemplify the universal type they seem to be superfluous. If all the 'cases' are bound to be alike, and we can know this in advance, why need we trouble to observe the idle repetitions which experience brings? One 'case' is as good as a thousand in the eyes of logic, nay much better, because much more convenient to argue from. Indeed, is it not an illusion that we ever really argue from 'fact' even in the one case? Is it not the function of fact merely to

stimulate the mind's faculty of intuition to grasp in its self-evident independence and rational necessity the law which makes the fact? Was not Aristotle right when he denied that the first principles of demonstration depended on the process which discovered them, and declared that Induction could not demonstrate, but only revealed the principle which springs up eternal in the logician's breast?

Thus encouraging himself the Formal logician proceeds to view inference from experience as a paradox, and arguing from facts as a delusion. It is assumed that the business of science is to demonstrate 'universals,' the properties of 'kinds' that are far more real than the particulars that reveal (or recall) them. For, strange to say, though knowledge of the true essences and kinds is in a way innate, yet the defective human intellect is somehow so perverse that it can grasp them only upon the (strictly irrelevant) stimulation of what seems an empirical fact. Thus even the *a priori* truths of arithmetic have to be learnt; it is, *e.g.*, only when you begin to count that you understand the eternal laws of number and their rational necessity. Without presuming to explain this mystery, let us go on to observe that the premisses from which we argue about 'facts' must be certain; and certain they can be only by intuition or by demonstration. Now demonstration leads only to an infinite regress (cf. § 2); hence you must accept intuition as the basis of all reasoning even from experience.

For the third alternative, viz. that certainty should be dispensed with and reasoning regarded as tentative all through, is too horrible to contemplate, and we doubt whether a logical mind could face it and preserve its sanity. For just think what it means. Are we to try to *prove* what we do not already know? To start from principles that are hypotheses, postulates, or fictions and facts that are disputable? To try to know a fact we do not *know* to be true by a principle we do not *know* to be true, and conversely to establish a principle we do not fully know to be true by facts we do not fully know to be true? The

risk is awful, and the reasoning is circular. For if the fact is to be true, the principle must already be so, while if the principle is to be true, the fact must already be so! And do not tell us that you are only bidding us argue from experience and as, in fact, the sciences all do, and that experience bears you out! For how can any one learn, truly learn, from experience? The very fact that experience supports such incredible proceedings is a fresh problem. It ought to be a matter of perpetual astonishment to a reflecting being. We cannot understand how experience can have any logical bearing, or indeed be possible at all.

§ 7. *How to reason from Facts*

To common-sense this anti-empirical position seems extreme, and its reliance on intuitions pathetic (cf. § 3); yet the difficulty is far from despicable. A logical meaning can be given to reasoning from experience only if experience really contributes something to the truth of our principles, and if nevertheless it is not a foregone conclusion that it must bear them out *ex officio*. In other words, the appeal to experience is needed, and is rational, only if both the principles and the facts are conceived otherwise than Formal Logic has hitherto preferred. Both must be conceived as subject to testing and correcting in the process of experience. Their claim to absolute certainty must be repudiated, and they must be regarded as plastic, and indefinitely adjustable until they fit each other, and relative to the purpose of the inquiry. Whether the 'fact' and the 'law' have been properly selected for the purposes of the inquiry, whether a 'fact' is truly a fact, whether it is one or many or a fraction, whether it is truly relevant and a 'case' in the sense required, must all be treated as important *and open* questions. So, too, it must be conceived as worthy of inquiry whether the 'law' experimented with is the true law or the true law for the case, or formulated in the truest way, and whether in arguing from the law which

has held in the known cases to others which are doubtfully 'cases,' the analogy will hold (cf. Chap. XVI, § 10). We must also frankly recognize that though the case and the law exist for each other and reciprocally influence each other, it is by no means easy to consummate their union. The case is meant to be brought under the law, and the law to apply to the case. But after all the law was extracted from former cases; and every case is different, and so there is always a doubt whether it may be taken as identical with its predecessors and whether the difference is irrelevant, especially as it may be relevant for some purposes and not for others. As Mr. Sidgwick wittily remarks, a thermos-flask may for some purposes be taken as a case of a 'hot-water bottle.'[1] Nor will fine words about the dignity of universals remove this doubt; it can be set at rest only by experience. And this is why experience is always relevant to reasoning, not only in 'induction,' but even in mathematics.[2]

The only answer, therefore, which those seem to deserve who dispute the possibility of reasoning from facts is to dispute the prejudices and preconceptions on which their objections rest.

(1) To the objection that 'valid' reasoning must not go beyond its *data*, the reply is that real reasoning must We must try to prove what we do not already know, for otherwise our reasoning would be irrational. To prove only what we already know would be superfluous.

(2) The interrelation and mutual adjustment of 'fact' and 'law' are not circular, when neither the one nor the other is held to be absolutely proved. On the contrary, the more clearly inadequate is the evidence for a theory, the more ambiguous and perplexing are the facts, the more necessary is it to experiment with theories

[1] *The Application of Logic*, p. 108.

[2] Formal Logic tends to regard mathematical reasoning as a sort of superhuman type of logical excellence. But it differs from other reasoning only in the antiquity and familiarity of the postulates on which it rests, and the ease with which it is conceded that they form 'ideals' to which experience does not 'correspond.' Nevertheless it cannot escape the test of application altogether. If, *e.g.*, experience were to change so that it no longer presented us with countable things, the principles of arithmetic would gradually lose their meaning.

that will test the facts and guide research. *Ex post facto* theorizing is scientifically useless; it is only by theorizing *in advance of the facts* that we thereby save time and trouble. Conversely, when we use hypotheses upon the facts we need *not*, and do not, regard them as fully established. If they were, what would they gain from a wearisome confrontation with facts that are superfluous!

(3) Until some attempt is made to show that we *cannot* use hypotheses (postulates), it seems vain to insist that our principles must somehow be rendered absolutely certain before they can be used.

(4) It is vain to dispute the fact that men do reason from experience, and allow to such reasonings logical weight. Hence logic must somehow account for this process.

(5) If, however, it merely contents itself with setting up a logical ideal which is unrealizable and incompatible with our actual knowing, is not this merely an arbitrary way of fostering a subtler scepticism? For to say that true 'knowledge' demands features no human knowledge can ever have is merely a way of denying the value of human knowledge, and an irrational way at that. For after all even 'ideals of knowledge' must be applicable to the knowledge they idealize.

We may conclude, then, our discussion of the Problem of Induction by observing that this logical mystery is solved when we cease to regard principles and facts as existing in abstraction from each other, and from the human mind that discriminates and uses them, and recognize instead that both alike are elaborated from and tested by experience, and exist for a mind that always operates selectively and volitionally, and is neither real nor rational unless it does this.

CHAPTER XIX

THE FORMS OF INDUCTION

§ 1. *The Mistaken Aims of Inductive Logicians*

THE inquiries of our last chapter should have shown how badly inductive reasoning lends itself to the purposes of Formal Logic, and how much reason there is for the antagonism between 'inductive' and 'deductive' methods which runs through the history of Logic. This antagonism has often been perceived, and inductive logicians have usually been in full and conscious revolt against the tyranny of the Syllogism. Nevertheless it is a curious fact that in the end they have always succumbed to its fascination. One after the other they adopt again the ideal of Formal Logic, and try to represent inductive reasoning in the guise of a formally necessary type of 'valid inference,' and labour to discover infallible methods, to yield results absolutely true irrespective of their 'matter,' instead of contenting themselves with observing how the logical value of reasonings from facts is developed and tested.

As it was, their failure was inevitable. In so far as they succeeded in apprehending the nature of inductive reasoning, they failed to arrive at forms which were absolutely 'valid,' and were jeered at by Formal logicians for their pains. In so far as they succeeded in getting 'valid' Forms, they were disappointed to find that they were the old ones, that they had failed to revolutionize Formal Logic, and that their reasoning was just as formal and deductive as the Syllogism. Unfortunately they

never saw *why* their fiasco was inevitable, nor how they had brought it on themselves. Neither they nor their critics ever understood what the failures of 'inductive' logic really meant and really proved. They really meant that *Formal* Logic was a failure, because Formal reasoning was a false ideal, and that 'material' truth was not to be reached that way. The failure of 'inductive' logic to provide 'deductive' with the material truth it needed in order to be more than an intellectual game, was really a disproof of the Formal ideal, and due to the fact that inductive logic had not discarded it. Instead of deriding the 'inductive' logicians, therefore, their deductive colleagues should have joined them on the stool of repentance and laboured with them to get rid of the fatal assumption that Formal truth was capable of independent existence.

As it was, the inductive logicians remained under the spell of Formalism, and their revolt proved abortive. They never quite realized that to aim at a *valid form* of Induction was to aim at something which would of necessity be as futile and impotent as the rest of Formal Logic, and that, if real truth was desired, the ideal of 'valid inference' was a radically false one to pursue, for the reason that no 'inference' would be worth inferring unless, irrespective of its form, there was a real question of its being false as well as true. Hence no really true inference could become unquestionable, and have its truth guaranteed, by its mere form, and a theory of Induction which professed to have discovered such forms would of necessity stultify itself and be inapplicable to the procedures of the sciences, and incapable of solving the real doubts with which they are struggling.

The theory of Induction, therefore, throughout its history consists of a series of vain attempts to serve both God and Mammon, to draw attention to the real procedures of knowing, and yet to force them into forms which assume that the real knowing is over, and that logical interest is restricted to the contemplation of its verbal products.

§ 2. *Aristotle's Accounts of Induction*

As usual Aristotle led the way. He devised the name Induction, though he nowhere makes it clear why he selected it, nor even how the different senses in which he uses it were connected in his mind. It is not, however, impossible to trace a connexion between them, provided that we distinguish sharply between *four* senses of the word in Aristotle, viz.:

(1) *The reasoning from particulars to universals.*

(2) *The adducing of examples of a rule.*

(3) *The exhaustive enumeration of the species of a genus, in order to justify assertions about the whole genus.*

(4) *The intuitive perception of a universal in a case.*

In the first of these senses 'induction' is the formulation rather than the solution of a problem, and neither in this sense nor in the second can it pretend to formal validity. In the third sense Aristotle regards it as formally valid. The fourth sense he regards as sometimes (and perhaps always) operative in the other three, and as somehow inspiring and validating what would otherwise be invalid processes, in virtue of the infallibility of the Intuitive Reason which he had assumed (cf. Chap. XVIII, § 3). All the four senses, however, are open to serious objections.

(1) The first raises the question of how we reason from experience. Aristotle's answer may be extracted from the interesting sketch of the psychical genesis of a 'universal,' which concludes the *Posterior Analytics* (ii, 19). The process starts with repeated perceptions, which are stored up by memory and ultimately establish a stable concept which 'comes to rest' in the mind. The account is remarkable for the purely scientific spirit of its psychologizing and for its bold attempt to bridge the Platonic breach between sense-perception and conceptual thinking. But it represents the formation of universals naturalistically as an entirely automatic and inevitable process, once a certain grade of mental development has been attained, and contains no hint of the selectiveness

and purposiveness which mark every step in the formation of our ideas. And it is evident that so purely mechanical a psychological description must abstract from the value of the products and the difference between true and false concepts. At the end, however, there comes a jump from psychology into logic. It is suddenly suggested that when the 'principle' is reached the merit of the achievement is due, not to the visible progress of perceptual experience, but to the 'Intuitive Reason,' which has apparently been guiding the whole process unseen. The motive for this transition is evidently the desire to guarantee the products of the psychological process by the infallibility of intuition, but it is painfully obvious that Aristotle is totally oblivious of the fact that *false* concepts grow up in the mind quite as naturally and readily as true. Until, then, means have been suggested for discriminating between true and false 'induction' of universal rules, the whole account remains on the level of psychological description, without rising to the level of logic.

(2) This method also is psychologically quite familiar. We frequently argue from individual cases, either to a universal rule or direct to other cases, and the event often bears out our predictions. But until our natural intelligence is corrupted by the ideals of Formal Logic it never occurs to us to imagine that such reasonings are, or ought to be, formally valid and irresistibly cogent. We are aware that there is a risk, and look to experience to bear out our predictions. Of course, therefore, this procedure does not satisfy the logicians. They call it *induction by simple enumeration*, and condemn it as puerile and precarious. So it is, if we demand a valid *form*. It is not dependent on its form for its success. It is dependent on our sagacity and experience, and does not profess to be either exhaustive in its enumeration or cogent in its conclusion. But it is indisputably a method that can be used, and often is used, to reach generalizations.

In Aristotle it appears chiefly in the form of reasoning from one case to another and is called *Example*,[1] and

[1] *Anal. Prior.* ii, 24.

distinguished from 'Induction' (in the third sense). But it is the nearest Aristotle gets to reasoning from and about facts, and we saw that it makes no logical difference whether we argue from rules, or from facts which are taken as 'cases' of rules (Chap. XVI, § 12). Aristotle notes that this adducing of examples is not formally valid, because its enumeration of the cases is incomplete. He evidently had not realized either how impossible complete enumeration was, or that if 'intuition' could ever guarantee generalization it might just as well perceive it in a single case as in a thousand.

(3) He described Formally valid induction, therefore, as dependent on an exhaustive enumeration in the form—

A, *B*, *C*, etc. are P,
A, *B*, *C*, etc. are S,
∴ all S are P;

pointing out that this reasoning is valid if the minor premiss exhaustively enumerates the cases of S, because then it is possible to convert it 'simply' into 'all S are A, B, C, etc.,' and to turn the argument into a syllogism in *Barbara*. But, oddly enough, he chooses to illustrate his doctrine not by a reasoning from 'facts' but by a weird biological superstition about a connexion between gall-lessness and longevity of which 'man, horse, mule' constitute the evidence. In other words, what have to be enumerated are the species of a genus and not the individuals of a species. And some logicians have supposed that he meant this and deserved credit for it, because it was not so impracticable to enumerate species as individuals. But they had not reckoned with Darwinism, and did not apparently observe that their pre-Darwinian interpretation leaves Aristotelian logic with no 'valid' way of reasoning from facts at all. And if we challenge the assumption that all the 'cases' of a 'kind' are necessarily identical for *all* purposes, because they would not be grouped into a kind unless they were identical for *some*, this logic has no way of reasoning about facts at all. Yet it is evidently of the greatest scientific

importance to know how far individuals, who in general may be classed together, may be treated as equivalent for any special purpose.

Secondly, the notion that the difficulty about exhaustive enumeration is diminished if we substitute species for individuals, is quite illusory. Not only are species variable, and is their past unknown, and their future unpredictable, but every individual may form a point of departure for new species (cf. Chap. V, § 8). Except from the temporary standpoint of human convenience, it is impossible to say where genus ends and species begins, where species ends and variety begins, where variety ends and individuality begins; while as for the ending of individuality, so soon as we agree to consider experience at all, we find that we can only say that if it ended anywhere science would end with it.

It is clear, then, that the exhaustion of the empirical material is an unrealizable postulate, which should be abandoned by a rational logic. The relevant 'facts' from which we reason must be as inexhaustible as our interests, points of view, and purposes, and in general our experience. Practically we come nearest to complete enumeration and strict universality in some of our most 'arbitrary' and most plainly man-made truths; that the days of the week should be seven, and the months of the year twelve, and the scale of notation ten, are 'facts' which will probably endure as long as the human race. Not *though* they are of our making but *because* of this. Yet it is plain that all these institutions could be changed if it seemed good to us, and attempts to change them are on record. But facts which depend on the stability of human wills are, after all, only a small fraction of the facts which concern us; from the rest of our 'inductions' we can never eliminate the risk that the uncontrolled course of events may turn them into falsehoods. And to endeavour to conceal this risk is to endeavour to deceive oneself. It is to use a logical formula as a sort of immaterial talisman.

(4) Concerning the attempt to make risky reasoning safe by alleging the guarantee of Intuition we need say little after Chap. XVIII, § 3. The appeal to intuition is always intellectually demoralizing, because it blocks further inquiry, and induces an attitude of mind in which plausible assertions are accepted without criticism. This would be detrimental even if the 'intuitions' accepted happened to be true; but seeing that many things which claim to be intuitions are certainly false, to look out for intuitions is a direct encouragement to self-deception.

To reject Intuition when it claims to be an infallible means of securing the formal truth of an induction is not, however, to deny that it occurs as a psychological process of perceiving the *relevance* of a fact to a particular train of thought. We saw in the last chapter (§§ 4, 5) that 'facts' could not be taken as given, but were always to some extent relative to the purpose with which they were observed and the products of a selection. Hence there is ample scope for an intuitive perception in the *selection* of the 'fact' or 'case' which is relevant to a particular rule, and psychologically such intuitions may be of great value.

Nor does Aristotle totally ignore this. He just mentions a *sagacity* (*ἀγχίνοια*) in instantaneously hitting upon the suitable middle terms in an argument.[1] And equally cursory mentions may be found in other Formal logicians. But the topic is always passed over lightly. 'Sagacity' exists, but Formal Logic can make nothing of it.[2] For it is impossible to give formal rules for it, nor are its inferences cogent. The process is 'psychology,' for it is not Formal Logic. It may be possible (and true) to infer (as Aristotle suggests) that a poor man seen talking to a rich is trying to borrow money; but there is no 'logical necessity' about the 'sagacious'

[1] *Anal. Prior.* i, 34.

[2] Cf. Mill, *Logic*, bk. iii, chap. i, § 2. "There is no science which will enable a man to bethink himself of that which will suit his purpose. But when he *has* thought of something" (which '*will* suit his purpose' presumably!), "science can tell him whether that which he has thought of will suit his purpose or not." *I.e.* when he has found out without logic, logic can tell him he has done right! What admirable caution! And yet how true to all Formal Logic.

guess. Of the real logical function of sagacity Formal Logic can have no conception, because it has no conception of the need for intelligent selection in the making of the logically relevant 'fact' and has not grasped that a *true* inference is *never* a 'valid' one, but always establishes its truth by a victory over a doubt.[1]

§ 3. *Bacon's Theory of Induction*

Bacon's conception of Science is remarkable for its intense preoccupation with the need of somehow discovering a way of utilizing experience, as also for his enormous belief in the human value of knowledge and keen consciousness of the revolutionary character of his doctrine. At the same time, his account of Induction will hardly convince even the most sympathetic critic that he succeeded in discovering an unexceptionable way of reasoning from facts, either for the purposes of Science or for those of Formal Logic. Formally his method appears to be neither new nor strictly valid; scientifically it is certainly neither adequate nor workable. The pathos of his position lies in the fact that he is so sublimely unconscious of its defects.

He begins by rejecting as unscientific empiricism the induction by simple enumeration of medieval science. He points out that a single contradictory instance will upset it, but is Formalist enough not to see that for scientific use this is not necessarily an objection, if the instance can suggest the substitution of a new generalization which is an

[1] It has recently been suggested in Oxford that Aristotle's real account of Induction is given in the *Topics*, which discuss the 'dialectical' commonplaces by which assertions might be attacked without any special knowledge of their subject-matter. Some of these τόποι appear to possess a certain resemblance to modern 'methods of induction' by 'Agreement' and 'Concomitant Variations.' But Mr. Joseph, who has forcibly urged this view (*Introduction to Logic*, p. 360 foll.), has to admit that in the *Topics* Aristotle is concerned with 'Dialectic,' *i.e. probable* reasoning, and not with what he conceived to be the conditions either of formal validity or of scientific demonstration. His aim, therefore, is radically different from that of the logicians who sought in their formal account of Induction to lay bare the nature of scientific reasoning. Moreover, it will be time enough to hail Aristotle as the discoverer also of the theory of Induction when we have examined the value of the account it gives of scientific procedure.

improvement on the old one. It is only if it is assumed that certainty at all costs and by the shortest route is the sole aim of inquiry that a method must be rejected so soon as it is seen not to be formally infallible. Bacon next assumes that Nature is composed of a definite plurality of '*Forms*,' *i.e.* structural principles intermediate between Aristotelian 'universals' and modern 'laws,' which in their combinations account for the whole sensible variety of phenomena. These 'Forms' it is the business of science to discover, and it is thus enabled to explain and predict the given phenomena which result from their combinations. To do this we are instructed first to draw up exhaustive tables of the phenomena and Forms under investigation, and then to exclude from our list any 'Form' which does not invariably co-exist with the phenomenon of which *the* Form is sought. For example, if we are trying to discover the Form of Heat it will not do to adduce 'celestial nature'; for though the sun's light is hot, that of the moon is cold. After a series of such *exclusions*, Bacon believed that a single Form would finally remain, to be the invariable cause of the phenomenon investigated and of nothing else.

It is easy to show, and has often been shown, that in point of form there is no novelty about this *Method of Exclusions*. Formally the process is simply a disjunctive reasoning easily symbolized thus:—'The Form of A is either *a* or *b* or *c* . . . etc. It is not *a*, for it occurs where *a* does not, nor *b* . . . etc. Therefore it is *z*.' The validity of this reasoning depends, of course, on the completeness with which the alternatives are stated, but Bacon seems to have realized neither the enormous material difficulties of securing such completeness, nor yet the puerile simplicity of his Formal exclusions. In this respect he shows himself a true pupil of the Formal logicians; he exhibits all their contempt or ignorance of the problems of scientific knowing and their childish reliance on forms which are impossible, and would be superfluous, if they were not. Nay, he also illustrates their uncritical acceptance of the established forms of

speech, the postulate of the infallibility of words. Because language presented him with a certain preliminary analysis of phenomena into discrete 'things' with 'causes' and 'effects,' he assumes, like Aristotle, that it must be a sufficient classification for all scientific purposes. That the stock of words with which any inquiry starts is merely the embodiment of the results of past inquiries, and that for any further inquiry we must be prepared to find it inadequate, occurred to him as little as to any of the 'dialecticians' whose ultimate appeal is to '*the*' meaning of words.

Yet once the claims of verbality are challenged, his method goes all to pieces. If the makers of language did not have perfect knowledge of the phenomenon and its causes, it cannot be assumed that the existing stock of words is adequate, and that the list of Forms is exhaustive. For to assume this is to assume that it is known within what limits the 'cause' is to be found. Nor can it be assumed that the 'Forms' are rightly formulated; that they include all that is relevant or exclude even the most grossly irrelevant. What ultimately turns out to be the true explanation of the phenomenon they may not recognize *in words* at all; and to extract it from the initial description may be as hopeful a task as discovering the laws of meteorology by inquiring why 'Zeus rains.' Or, again, they may classify it partly under one word and partly under another, or ambiguously under several. In short, if scientific induction could ever proceed by first stating all the probably relevant alternatives and then eliminating all those that actually were not, it would be child's play indeed, and far more 'puerile' than the simple enumeration Bacon condemned. But in point of fact it cannot start with exhaustion, and must never take it for granted; it must always remain alive to the possibilities that there are undiscovered alternatives to be taken into account, and that the conceptual tools with which the inquirer has to work are inadequate, and have to be re-worded.

It is no wonder, then, that Bacon's inductive method

failed, even on his own showing. He did not find in the scientific language of his day the data from which a tenable theory of heat could be extracted by a series of simple exclusions. His method deserved to fail, as the Syllogism it tried to supplant, and only succeeded in imitating, failed, and for the same reason. Like it, it had begun by taking as done what it is the whole business of science to do, and had then tried to construct an *ex post facto* valid form, which was to be infallible in the abstract, but only turned out to be inapplicable to the concrete. Like it, it had abstracted from the *proving* of truths in order to elaborate a 'form' of proof, though when it is met with the objection that in point of fact we cannot reason by such forms, it had not the Syllogism's sublime audacity of retorting, 'Well, that only shows that I am the *ideal* of reasoning.'

§ 4. *Mill's Notion of Induction*

Inductive logicians learnt nothing from Bacon's splendid failure. They continued to accept the ideal of Formal Logic, and to look for formally valid 'methods' of Induction. But their researches only brought out the self-contradictory and self-defeating nature of the task they had set themselves. We may briefly illustrate this from the case of the best known of inductive logicians, J. S. Mill.

Mill's ambition was to formulate 'experimental' Methods of Induction which should *both* formulate the actual procedure of scientific reasoning from facts, *and also* yield canons for such reasoning of such stringency that any reasoning in conformity with them would have to be regarded as formally proved.[1] But the incom-

[1] Mill defines induction as an inference 'from the known to the unknown,' from 'what we *know to be true* in a particular case or cases' to what 'will be true in *all* cases which *resemble* the former in certain *assignable* respects,' or as inferring from *some* instances to '*all* instances of a certain class; namely, in all which resemble the former in what are *regarded* as the *material* circumstances,' or more briefly as 'the operation of *discovering and proving* general propositions' (*Logic*, iii, 2, § 1; 3, § 1; 1, § 2). Mill does not realize what difficult questions he has begged in the words italicized. Can we ever presume that our data are perfectly known, that our 'cases' are rightly selected, that they constitute a real

patibility of these two aims reveals itself in the fact that any interpretation of them which is scientifically tenable renders them formally invalid, while any that renders them formally cogent also renders them scientifically superfluous, because it represents inductive inference as either impossible or unmeaning.

Mill's superiority over Formal logicians of the 'deductive' variety consists in his firm conviction that it must be possible to utilize experience, and that knowledge of fact must be logically relevant. He accordingly conceives the problem of Induction as being that of reasoning from 'facts,' or more precisely that of discovering the 'causes' of phenomena ('effects'). But that 'facts' may be taken as given in a *discrete* series, that they have determinate 'causes,' that every 'cause' is unambiguous and is the unconditional and invariable antecedent of its 'effect' (though there is an apparent 'plurality of causes' which is scientifically troublesome), is taken for granted with little or no inquiry. And the Methods are then propounded as scientifically adequate and logically cogent ways of inferring regularities of causes from observed regularities of events.

The general presupposition of the procedure is the axiomatic Law of Causation or Uniformity of Nature. It yields a general guarantee that events shall occur in an intelligible order, and will have to be discussed by us in the next chapter. Mill regards it neither as an intuitive self-evident truth nor as a postulate, but as a fully proved induction from experience. It is proved, however, not by any formally cogent method, but by a simply enumerative induction from an enormous mass of uncontradicted experience of great antiquity. But he also sees, more clearly than many philosophers, that such a general principle of Induction is scientifically quite inadequate. It is not enough to believe that every

whole, that the circumstances 'regarded' as 'material' really are so, that the resemblance argued from will justify our assertion of identity, that methods of discovery ever amount to formal proof? And if science does not and cannot presume any of these things, is it not clear that a theory of Induction based on them must be irrelevant to its actual procedures?

event has some cause, if one cannot particularize the 'cause' of any particular event. Accordingly there is a need for special Methods to determine when we are entitled to say we know *the* cause of any event.

§ 5. *Mill's Experimental Methods*

The first of Mill's five methods is called that of *Agreement* and formulated as follows:[1]—

(1) "If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause of the given phenomenon."

The second, the *Method of Difference*, runs thus:—

(2) "If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur have every circumstance in common save one, that one occurring only in the former; the circumstance in which alone the two instances differ is the cause of the phenomenon."

The *Joint Method of Agreement and Difference* is really "a double employment of the Method of Agreement," consisting of agreement in the absence and in the presence of the suspected cause. Its canon is stated thus:—

(3) "If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ is the cause of the phenomenon."

The fourth Method, called the *Method of Residues*, is formulated as follows:—

(4) "Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents."

[1] The phrases which are designed to adjust these Canons to reasoning from causes to effects are throughout omitted as irrelevant complications. For the real problem of Induction is to get *to* the 'cause.'

Lastly, in cases where a phenomenon cannot be wholly suppressed but only varied in amount, the *Method of Concomitant Variations* must be used. It declares that—

(5) "Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is a cause of that phenomenon (or connected with it through some fact of causation)."

Now it is evident, and indeed emphasized by Mill himself, that logically there is a great sameness about these Methods. The Joint Method of Agreement and Difference is really a double application of the Method of Agreement. The method of Concomitant Variations is a modification of that of Difference. The Method of Residues is plainly secondary, seeing that it openly appeals to 'previous inductions,' and so cannot be credited with capacity to operate on unscrutinized crude 'facts.' But there is great similarity also between the Methods of Agreement and Difference. Both are methods of elimination; *i.e.* they try to eliminate from a complex of phenomena *in which the desired 'cause' is suspected to be lurking*, the irrelevant 'circumstances' which conceal it from view. Thus the procedure is formally just the same, and the same as in Bacon's Method of Exclusions, and as in disjunctive reasoning. Its 'inductive' character, therefore, cannot consist in the form of reasoning, but only in the selection of the facts reasoned from. In logical cogency, however, there is admittedly a great difference between the two Methods. The Method of Agreement has no means of determining whether the 'event' it takes to be the 'effect' is really *one*, and not so vaguely conceived as to be something which may ensue upon a number of causes; hence what is called the 'plurality of causes' (Chap. XX, §§ 7, 9) may always baffle it. Mill's theory of Induction really stands and falls logically with the Method of Difference. All of this has long been recognized, and was practically admitted by Mill himself.

What has not been as strongly emphasized is that this whole theory of Induction is applicable only to one particular stage in scientific knowing, and that by no

means the most difficult. A glance at these canons shows that they all presuppose a very definite state of the scientific inquiry. They imply that the 'phenomenon' is unequivocally given, with its limits clearly mapped out and without a question as to what are 'instances' of it and what not. Similarly the antecedent 'circumstances' are taken to be 'given,' distinct, definite, and definitely observable. In short, the 'facts' must be such as to allow the reasoning to be adequately formulated in symbols as follows:—

(1) *Agreement.*

ABC	*a*bc
ADE	*a*de
AMN	*a*mn

∴ A is the cause of *a*.[1]

(2) *Difference.*

ABC	*a*bc
BC	bc

∴ A is the cause of *a*.

(3) *Double Agreement.*

ABC	*a*bc	B′FG	b′fg
ADE	*a*de	D′HI	d′hi

∴ A is the cause of *a*.

(4) *Residues.*

(?X)BC	*a*bc
BC	bc

∴ X is the cause of *a*.

(5) *Concomitant Variations.*

ABC	*a*bc
2ABC	2*a*bc
ABC	*a*bc
—	—
2	2

In other words, the Methods are trustworthy transcriptions of scientific procedure only if, and in so far as, the state of knowledge they presuppose actually occurs in scientific research.

[1] It is not worth while to conceal the barefaced question-begging of the symbolizing by writing ABC—*d*ef, AMN—*d*gh, etc., so long as the *definite* character of the 'circumstances' is preserved.

§ 6. *Criticism of Mill's Methods*

(1) Now, the first thought that must occur to a scientific critic is that the state of things presupposed does *not* exist in the beginnings of *any* science. No science starts with a clear knowledge of its proper field of operation, with its 'facts' sorted out into 'antecedents' and 'consequents' and 'circumstances' and 'instances' in the manner Mill's Methods suppose. It is confronted rather with a continuous flow of happenings, where nothing is distinct and everything seems to pass into everything else in an incalculable way. It can hardly guess, therefore, what belongs to what, or what it all means, and its initial guesses are all wrong, though a few of them may be found useful stepping-stones in the advance to firmer ground. Moreover, this initial stage of scientific development is the longest, as it is the most arduous, and no theory of Induction that professes to be scientifically helpful should ignore it. Yet the Inductive Methods plainly do; it is clear that even if they argue from facts at all, they do *not* argue from *crude* facts, but from a material which has already somehow been cut into definite scientific shapes. They do not, therefore, begin at the beginnings of Induction, nor do they adequately describe the whole of the inductive process.

(2) It is almost equally obvious that upon any *literal* interpretation the demands of the Methods can *never* be complied with. We never find two cases which have 'no circumstance in common but one,' so that we can apply the Method of Agreement, or differing in nothing but the presence of one circumstance, so that we can apply the Method of Difference. Literally construed, the Method of Agreement postulates an all but total change in the 'circumstances,' and that of Difference an almost total immutability of the universe, and both demands are impossible. The persistence of the cosmic order, the sun, the earth, and the atmosphere, is sufficient to refute the one, the universality of change the other, while if any attempt is made to consider them collectively they

are at once seen to be incompatible. For together they demand that the world shall be capable both of entire change and of entire stability, in every circumstance but one.

Both, moreover, are formally vitiated by an extraordinary omission which also renders them scientifically nugatory. Both have forgotten the scientific observer, who is surely an indispensable 'antecedent' to every experiment. His effect on the Method of Agreement is either that the two 'cases' always have *two* antecedents in common, viz. 'A' and the observer, or that the observer is himself the sole persistent antecedent. Now in the former case the Method is formally vicious, while in the latter it will conduct to the inference that he is himself the cause of the phenomenon and the author of the uniformity of nature. Nor can the identity of the observer be given up, for if he did not remain 'the same' throughout, the resulting change in his personality would probably vitiate his observations still more seriously. In an argument by the Method of Difference, on the other hand, the observer forms part of the rest of the universe which is supposed to undergo no change as the experiment progresses. But is not this to demand that the experiment shall make no difference to him, *i.e.* that he is to be at the end as he was at the beginning? And does not this mean that he is to have no understanding of what he is doing? So soon as he understands what his experiment means, *two* circumstances have changed and his inference becomes formally invalid!

The Methods of Double Agreement and Concomitant Variations share, of course, the defects of their primaries, the former being remarkable for the way it heaps impossibility on impossibility. For how can instances be discovered in the same universe which have nothing in common save the 'absence' of a circumstance? Will not any two 'instances' have innumerable absences in common? And what is to guarantee the relevance of the two sets of circumstances to each other? If we are prospecting for gold, will it be reasonable to note, not

only that gold does occur in certain rocks, but also that it does not grow on trees nor occur in pumpkins or black beetles? The defects of the method are so glaring that in most modern statements a clause has been introduced to ensure a sort of general relevance of the sets of circumstances, stipulating that the points of resemblance and difference shall be 'important' or 'material.' But the omission of plain irrelevance yields no guarantee of the inclusion of the really relevant, and besides this proviso at once opens up entirely new points of view, which cannot be tolerated on the ground of Formal Logic. The strict logician, therefore, is within his rights when he protests against such vague phrases and inquires who is to be the judge of the 'importance' of a resemblance, and how it is to be ascertained. For if it is to be decided in advance, mistakes will be frequent; while if it is only decided after experiment, it will be known only *ex post facto*, and will be scientifically useless.

§ 7. *How to give a Meaning to Mill's Methods*

In spite of all these unanswerable criticisms the Methods were not so far wrong in what they meant. Only it is clear that they do not mean what they say. To give them a good scientific meaning, and to remedy their misconstruction of scientific procedure, it is necessary to insert one little word, a magic word, however, which disrupts the whole of Formal Logic. Instead of talking about facts at large, let us say *relevant* facts. The reference to relevance will then at once transform the Methods, and render them scientifically workable. It will relieve the Method of Agreement of the burden of enormous masses of cosmic sameness, and the Method of Difference of incalculable multitudes of changes, if we can make sure that the persistences in the one case and the changes in the other are both irrelevant at least for the purposes of the observation. It may thus become true that two observations have *only one relevant* (or 'important' or 'essential') circumstance in common and that two

experiments differ only in one *relevant* point. It is also a very easy correction to make, and one that is made tacitly in every scientific description.

And this, of course, is why Mill's Canons seemed to work, and to represent the procedure of science. The practical insight or sagacity of the scientist always tacitly applied them to relevant facts, and supplied the logician with illustrations from sciences which had already practically and painfully worked out what 'facts' were relevant to a given sort of experiment, and what not. But all these illustrations were *ex post facto* and did not illustrate any actual case of knowing, while no attempt was ever made to show how the Methods could ever be applied to questions that were really undecided.

Nevertheless the appeal to 'relevance' will not save the formal validity of the Inductive Methods. For it has to be paid for and exacts a price no Formalism can pay. It implies a number of things which are fatal to the 'ideal' of Formal Induction.

(1) It makes it clear in the first place that the Canons have no application to the early gropings of a science when little or nothing can be pronounced irrelevant.

(2) It means relation and relativity to purpose. For a feature in the total content of experience which is selected as a 'fact' relevant to one purpose need not be so to another. So relevance, purposiveness, and selection deprive scientific 'fact' of its absoluteness and 'independence.'

(3) They mean, as we have noted at intervals throughout, what a consistent Formal Logic must abhor as 'psychology.' The 'relevant' (as its very etymology shows) is what is *selected* by a knower as '*helpful*' for his purpose.

(4) To admit relevance is to renounce the ideal of Formal validity. For the decision about what is relevant or not can never be a Formal affair, but presupposes a knowledge of the actual circumstances and purpose of the inquiry, and must always depend on the material knowledge possessed at the inception of the inquiry and

be corrected by the accretions of material knowledge which accrue during its progress. Formally, then, the relevant and the irrelevant 'facts' are indistinguishable.

(5) There must not only be an absence of formal cogency about inductive reasoning from relevant fact, but a presence of real doubt. For there must always be risk in drawing the line between the relevant and the irrelevant, and the logician at least should be conscious of it. This risk can only be shown to have been groundless *ex post facto* by the success of an experiment, and even this never yields a theoretically incontestable or absolute proof. The risk must always, therefore, be allowed for in an account of actual knowing. Science, therefore, has always to treat it as real, and can only marvel at a 'logic' which gaily ignores it.

(6) It follows that nearly all philosophers have been completely wrong in their conception of the ideal of knowledge. The ideal is *not* all-inclusiveness and indiscriminate hospitality to every aspect of fact, however insignificant and remote from human interests, but selectiveness and deliberate concentration on the relevant. Now this implies a stern exclusion of the irrelevant, and it is not too much to say that it discredits utterly the search for all-inclusive unity as a principle of knowledge. For it implies that any unity which seems to be *given*, such as the objects of sense-perception, is not *known*, while that which is *attained*, such as the system of a science, is an artificial product of selections, and cannot be all-inclusive, just because it rests on the exclusion of the irrelevant.[1]

Perhaps, however, an attempt may be made to evade these consequences by declaring the relevance of the facts argued from to be a formal postulate of Induction, analogous to the Syllogism's postulate of materially true premisses. But if so we should merely be making out a case for a third branch of Logic, underlying both Induction and Deduction, which would determine the relevance of 'fact' and be more important than either.

[1] Cf. Chap. XX, § 3.

And even then we should arrive at no better result than in the case of deductive proof. For though the region of relevance is that which surrounds the precise point of the inquiry, it is *not* itself the point we are trying to get to. If, therefore, boldness in postulation were enough to advance science, why not postulate at once that we had got, not merely to the relevant, but to the actual point, which alone is relevant in the end? If, then, relevance may really be postulated, *i.e.* if the 'facts' really are all relevant, and *known* to be so, where will be the inference? And what need will there be for the process of induction? Why enumerate masses of irrelevance, and go through the farce of eliminating it, *if we already know* that nothing is relevant to the occurrence of *a* but the antecedence of A? Why trouble about the other 'circumstances' at all and mention ABC, ADE, etc.? If we can postulate that our antecedents shall be *partly* relevant, why not postulate that they are so *wholly*? But in that case the *inference* again becomes unreal, as it did in the Syllogism, when it was taken as certain that whatever was called a 'case' of a 'law' must conform to the law.

The formal verdict on the Methods of Induction, therefore, inevitably is that they are impossible, if the relevance of the facts they use is not yet established, or superfluous, if it is. As before, real reasoning cannot be reduced to Formal shape, and the 'cogent' Forms are not forms of reasoning. And, as before, the only way of avoiding this dilemma lies in recognizing that real reasoning is never concerned with initial certainties, but always refers to a real doubt. In the case of reasonings from 'facts' this doubt concerns the relevance of the selections from experience which are called the 'facts,' and the correctness of these selections is precisely the point to be tested. In any real use of inductive reasoning this relevance must always, therefore, be initially doubtful, and cannot be postulated.

CHAPTER XX

CAUSATION

§ 1. *The Problem of Causation*

THE conception of Causation is a most important part of that equipment of general notions for application to experience with which all men start, and which no man is wont to question. It is entrenched in the forms of every one's language and the habits of every one's thought, and has the backing of immemorial experience. It is no wonder, therefore, that we naturally resent anything that seems like an attempt to question the meaning of so familiar an assumption. Logicians are in this respect like other mortals; but their position is different, because for the purposes of their study it is their duty to give a coherent account of the meaning, function, value, and validity of the causal explanation of phenomena. It is not too much to demand of them, therefore, that they should consent to observe the actual use that is made of the conception in ordinary and scientific thinking, before laying down the law as to what it ought to mean, or betaking themselves to 'metaphysics' in order to avoid 'contradictions' which too often arise only from their own failure to understand the real function of the causal principle.

If they would consent to do this, they would at once observe a number of patent facts, which, in the present state of Logic, we shall be able to arrive at only after a protracted struggle with factitious puzzles and paradoxes. It would be observed, for example, (1) that experience

does not originally come to us all nicely labelled and dissected into 'causes' and 'effects,' but floods us with an undiscriminated gush of happenings, and that it is the function of causal analysis to protect us in this torrent and to preserve our sanity. Not that it is ever quite successful; it is powerless to alter the nature of experience, and even our conceptual interpretation never completely dissevers it into connexions of causes and effects, even to the most finely analytic intelligence But (2) it is clear that the function of the causal analysis is to transform experience by dissecting it ideally and substituting for its chaotic flow an orderly series of causes and effects. (3) This procedure is plainly an interpretation we put upon experience, and on the face of it arbitrary and improbable. Hence (4) it must naturally seem monstrous to all who hold that man's *rôle* in knowing is only passive, and counts for nothing in the construction of reality. Our procedure, therefore, is not 'self-evident,' but almost self-refuting. It clashes sharply with deep-seated philosophic prejudices, and will not be easy to justify in philosophic eyes. And yet the fact remains that causal analysis is in full operation, and that without it both our science and our practice lapse into shapeless ruin. And then what would be left for philosophy to 'contemplate'?

Philosophy has, since Hume, in a manner dimly seen that it could neither live at all without the causal principle nor comfortably with it, while its own prejudices prevented it from recognizing, and often from seeing, the obvious facts aforesaid. It felt bound to 'criticize' the working creed of ordinary life and science, but not to put anything workable in its place. Nor indeed could it; for not only had it uncritically adopted their most untenable assumptions, but it had proceeded to discard the checks on them which common-sense had recognized in practice. No wonder such a procedure led to 'difficulties' which blossomed into absurdities, when they were sublimated into metaphysics. The philosophic 'analysis' of the conception of Causation became a systematic

misinterpretation which gradually eliminated all that was true and valuable in the common-sense notions on the subject; but we must follow it in the hope that systematic error may prove more enlightening than confusion.

§ 2. *Philosophic Criticisms of the Common-sense Notion of Cause*

Any philosophic criticism of a conception in common use must accept it to some extent. For the very fact that it is in general use proves that it has value, and cannot be wholly wrong. Unfortunately, however, philosophy has in this case discarded the right and accepted the wrong elements in the working conception of Causation. It rejected the ideas that 'causes' were plural and partial and 'arbitrary' and prior to their 'effects'; it accepted the ideas that they were *given* and *necessary*, denied that they were *partial*, and concluded that they were *identical*. The disastrous consequences may be briefly sketched.

(1) Common-sense had assumed that 'causes' and 'effects' were *given* as such. But as it had not reflected on the subject, it was not pledged to deny that the apparently ready-made 'effects' and 'causes' from which it started might be products of past discoveries, gradually fished out of the flow of happenings and fixed by tradition. But when philosophy accepted the results of common-sense analysis, it could not be satisfied with anything so humdrum as the belief that men may gradually have succeeded in disentangling certain sequences of events which may with reasonable confidence be regarded as guides to other events, and that this is all that causal analysis does or aims at doing. It did not seem enough merely to have empirical knowledge of particular causes; the dignity of philosophy aspired to understanding the causal principle or 'Law of Causation.' 'Cause,' therefore, must mean something grander, and be equipped with a worthier pedigree. It was natural, therefore, to conceive it as a universal axiom

of the necessary connexion of events, and to denominate it an *a priori* necessity of thought. As such it must be prior by nature to its effect, which it infallibly guarantees. And to criticize it is sacrilege.

Naturally enough critical inquiry into the evidence for the current conception was most unwelcome, and when Hume began it, it was universally decried as 'scepticism.' But before the inquiry was concluded the very schools which had tried most laboriously to answer Hume had themselves gone far beyond him in the destructiveness of their results. The event showed then that Hume's 'scepticism' had not gone far enough.

Hume, unfortunately, had not called in question the *givenness* of 'causes' and 'effects.' Indeed, his interpretation carried to an extreme the logical trick of presuming that done which it is the whole work of science to do; he assumed that the causal analysis was complete, and that every distinguishable psychic content was a distinct existence, with the result that he was unable to discover any connexions between events that had been rendered 'entirely loose and separate.' He consequently overlooked the continuity of the flux of experience altogether, and in this gross oversight his critics obediently followed him.

(2) But he directed his criticism very effectively upon another element of the current conception, the belief in a *necessary connexion* between 'cause' and 'effect.' He pointed out that it was nowhere an observable fact,[1] but always a subjective addition made to the temporal succession of events. This addition, however, he conceived as a habit of expectation mechanically engendered by uniformities of experience in a passively receptive mind, and not as the act of an actively analytical intelligence. In other words, nature was conceived as an assemblage of discrete successions, among which those

[1] Not even in the psycho-physical sequence of volition-motion, which is the only case where causal efficacy or power, if it exists, would be a matter of direct experience. Hume's proof of this is, however, at bottom only an assertion of his resolve to treat his own acts as if they were external phenomena. Cf. my article on "Humism and Humanism" in the *Aristotelian Society's Proceedings*, 1907.

sequences which recurred frequently came to be thought together ('associated') so firmly that human minds could not but expect them. Thus causal necessity was merely the subjective reflexion of objective regularity.

That 'necessary connexion' is not a fact of observation was undeniable, after it had once been pointed out, and none of the confuters of Hume could deny it. But it seemed at first as though Hume's other discovery, viz. that it is a subjective addition imposed on the given facts by us, might lead to a proper appreciation of the part played by human activity in causal analysis. Kant had the great merit of seeing that Hume's discovery would cease to mean 'subjectivism,' if analogous procedures could be traced throughout what was universally admitted to be experience of objective reality, and that the only difference entailed would be a new analysis of the notion of 'objectivity.' But unfortunately he had been brought up in the strictest sect of rationalistic faculty-psychologists, and was accustomed to divide the concrete personality into a number of discrete 'faculties.' So he tried to doctor the disconnected Humian 'impressions' with a whole army of faculties almost as disconnected.

'Cause' became one of an apostolic band of a dozen 'categories' or 'pure conceptions of the understanding,' which the intellectual nature of the mind inevitably imposed *a priori* on the atomized 'matter of sensation' which was 'given' it. More specifically, it was the formulation of an *a priori* rule applicable to the succession of events. Kant, however, was so taken up with elaborating the system of the *a priori* contributions of the mind to the formation of experience that he never troubled to consider how in scientific practice such a rule was to be applied, why, that is, the category of Causality should be chosen in contemplating any experience rather than any other category, and why the sequence A — B should be regarded as causal and A — *a* not, how causal sequences were to be discriminated from casual, otherwise than *ex post facto*, and how from a belief, however firm, in

a priori truth of the existence of causes a transition was to be effected to a discovery of particular causal laws. In other words, Kant was far from grasping that in order to bring his *a priori* forms to bear on experience there was need of a *process of selection*, and that the Causal problem both for science and for common-sense is always how to assign *particular* events to *particular* causes.

(3) To perceive that the function of Causation is to explain particular events is to perceive that 'causes' must be *partial*, and selections from the totality of phenomena; while nothing more signally proves the failure of current philosophy to grasp the cognitive function of Causation than the protest it raises against the notion of partial causes.

It starts by observing that alike in the scientific and in the common-sense use of the causal principle no attempt is ever made to state the antecedents of the 'effect' exhaustively. What is sought for, and accepted, as the 'cause' is always a *selection* from the totality of antecedents. And, as is natural in selections, it varies. The 'same' event may have a multitude of causes, and different persons may determine its 'cause' differently. What 'the cause' of an event is (or is called) depends on the speaker's interest and the purpose of his inquiry. The 'cause' of a death may be found in an 'accident,' or in the man who let off the gun, or in the injury to his victim's organs, or in his general state of health, or in his happening to move into the line of fire, or in his carelessness or drunkenness, or in that of the man who fired, or in the mechanical nature of the gun, or the physical nature of the powder, etc., etc. All these circumstances were among the antecedents, and each may be regarded as the essential point thereof by the agent, or the patient, or the doctor, or the coroner, or the moralist, or the physicist, etc., who is interested in the event. If any of them were asked whether the other antecedents were not equally present and indispensable to the event, he would assent, but make a distinction between the 'cause' and the 'conditions' which,

though indispensable, were not worthy to be called the 'cause.'

Now all this seems utterly illogical to the philosopher. Is it not utterly arbitrary to select a single antecedent, and to restrict the title of cause to that? And is not the distinction of 'causes' and 'conditions' quite as arbitrary and unsound? The 'conditions' are just as necessary to the event's occurrence as the 'cause.' Why, then, should they be excluded? Surely a truly philosophic view must try to state the whole cause, or what we had perhaps better call the *ground*, and eschew the impropriety and inconsistency of scientific practice.

(4) How, then, shall we conceive this cause or ground? Ultimately it must include the totality of reality. For every 'antecedent' ramifies indefinitely, and we can never show that if anything had been different the event would have been the same. It is clear, therefore, that the true 'cause' produces not merely the beggarly 'event,' on which common-sense and science had fixed their myopic eyes, but vastly more. The total 'effect' is the totality of reality, and it is only by an illusion of abstraction that partial 'causes' and 'effects' seem to exist. Here at last is something worthy of philosophy! The Whole of Reality is the Cause, and nothing is too mean or too recalcitrant to be included in it; and the Whole of Reality is the Effect, and nothing is too recondite to be included in it.

But what, then, is the difference between them? Are you not making 'cause' and 'effect' the same? And what has become of change and of the cause's antecedence to the effect?

How can you ask so foolishly? Why, of course *Cause and Effect are identical.* 'Antecedence' is a superstition, and change is an illusion. For consider: no sooner do you get the last antecedent than you get the effect. Put your gunpowder under the Houses of Parliament and secure the benevolent neutrality of the rest of the universe and then apply your match. You

have not an 'antecedent' of the explosion, but the explosion itself. Believe us or try it!

It is only on the lower planes of insight, then, that 'cause' is prior to 'effect.' Neither is before the other. The time-relation is irrelevant; it vanishes in the full daylight of philosophy. It is gone, and with it go the whole host of popular superstitions. Nothing is left but the glorious conviction of the unity of the universe!

Nothing assuredly of common-sense or science. Nothing that either wished to have explained. Their problems have disappeared, or rather have been exploded. But have we after all got what we wanted? Is the truth to which philosophy has led us the truth we had set out to find? Did we not desire to learn how to connect in reasoning 'facts' in the plural? And lo! there are no more facts; they are all taken up and assimilated in the Whole! But did we wish to know that the universe is one, when we asked what was the 'cause' of a particular event? And was this *all* we wished to know? Is that the universal answer to every question? It is all we are told, but is it the answer to *our* question, or indeed to *any* question?

Apparently it is not, but what of that? You may not have got what you wanted, but you have got something higher and better. Be content with that. Why molest a philosophic theory with the perplexities of practice? When philosophy is satisfied, it befits science and practice to be reverently mute.

The logician *qua* philosopher may profess himself entirely satisfied with this result, but *qua* scientist how can he acquiesce in it? For he has got a result which for practical and scientific purposes is perfectly useless, because it is impossible to argue from it. If the attempt to state the antecedents of an event in their full particularity could ever be successful, their uniqueness would be so clearly revealed that we should see that they led up to just that event *and to no other*, and to reason from this case would in consequence be impossible. Formally, of course, it would be possible still to represent

it as a generalization, but in reality the generalization would be a sham. As Alfred Sidgwick ironically points out, who ever cares to know that "all cases presenting exactly the details found in the *Rue Morgue* are cases where a double murder has been committed on two helpless women by a large fulvous orang-outang of the Bornese species, escaped from a sailor belonging to a Maltese vessel"?[1] We know that just those circumstances will never recur, and that the whole of them can never be relevant to any future case of a mysterious murder.

Moreover, this doctrine conveys just as little comfort to the logician. For logically it seems meaningless. For all it asserts is the tautology that 'the universe = the universe,' and that it does not matter whether we call it 'cause' or 'effect.' How is this piece of verbalism to enable any one for any purpose to trace any particular connexion between any particular cause and any particular effect, or to predict anything in particular? And yet, unless he can do this, how can he reason about causes and effects at all? If, then, the truth of the causal principle rests on the unity of reality, it *falsifies* every use of it in actual knowing.

Is it a wonder, then, that this staggering paradox, which is well worthy to rank with the strictly Formal notion of proof, which was bound to regard Inference as extra-logical (Chap. XVI, § 10), should excite some comment? Can a course of criticism be on the right track which comes to the conclusion that in any sense in which the conception of Causation is philosophically tenable it is useless, and in any sense in which it is scientifically useful it is false?[2] Is it not more probable that philosophic criticism has somehow gone astray?

§ 3. *The True Interpretation of the Common-sense Notion of Cause*

The logician at all events should have no doubts about his proper policy. He is not bound to side with

[1] *The Application of Logic*, p. 31.

[2] Cf. *Riddles of the Sphinx*, p. 69 (new ed.); and A. E. Taylor, *Elements of Metaphysics*, p. 182.

'metaphysics' in its quarrel with science and practice, nor to help it to find shelter in unmeaning verbiage. His proper business is to explain how causal reasoning is possible. And so he may avow, if he finds it to be the fact, that the only possibility of explaining it seems to him to lie in defending, emphasizing, and extending the very features in it which have hitherto been targets for the greatest philosophic scorn, and in questioning those which have hitherto met with philosophic acceptance.

In the first place, then, any account of Causation which is based on its actual function in knowing must utterly refuse to apologize for or retract the *partial* character of 'causes.' Causal explanation is *analysis* of the given, *and not synthesis*, and its meaning is unintelligible unless this is grasped. Its aim is not to state the *whole* of the 'antecedents' or 'conditions' but a *part*, to extract the *relevant and important* part which it calls the cause: to require it to include the whole is to ask it to stultify itself, as the result of the philosophic 'criticism' sufficiently establishes.

The very last thing, therefore, that causal analysis is concerned to assert is the unity of the universe, and the 'identity' of effect and cause. For in one sense such unity and undiscriminated identity is the very thing it starts with and is trying to get rid of; in another it is so distant an ideal that it hardly enters into scientific calculations. The error of the enthusiasts for unity is due to their failure to discriminate between unity as a datum and unity as an ideal. Unity is a datum in the shape of a chaotic flux of experience in which 'cause,' and 'effect,' and plurality are not yet discriminated; it is an ideal in the shape of a perfectly articulated and all-embracing system of cognitions. But between them lies the whole world and work of science, and only the most blindly unobservant philosophy will confuse, and only the most recklessly rationalistic will identify them. There is no royal road to absolute knowledge which metaphysics can traverse by a leap. The only way of passing from the

first to the second sort of 'unity' is by the long way of Science. Now the way of Science begins by turning its back resolutely on the notion that knowledge is reproduction of the given. It is analysis, rearrangement, transformation, nay, if you please, 'mutilation' and falsification, of the given. That is, it begins and ends with selective operations of our thought upon our datum. No wonder that the one order it aims at is so different from the one chaos that is given, and that unless this is clearly understood philosophy beats the air and makes no progress.

It is evident then that, if we really wish to know, we cannot grasp, and ought not to imagine that we are grasping, reality as a whole, but must take it piecemeal. No significant judgment ever aims at anything so impossible and self-defeating as stating the whole of reality.[1] For not only would it fail in fact, but it would be frustrated by its very form—the distinction between its subject and its predicate would necessarily import duality into what it was trying to conceive as a unity.

Whenever, therefore, we apply the causal principle, we look for 'causes' in the plural of 'effects' in the plural. We refuse to accept the given in its undifferentiated confusion, and declare our determination to dissect it. And we claim a *right* to do this. The very first act of ideal dissection of the datum, the first singling out of a 'thing' from the flux of events, the first recognition of a distinct 'event' as an object of inquiry, is an 'arbitrary,' artificial, human interference with the given. Alike for science and for action *every 'fact' is man-made*, as a condition of its being a particular fact at all. It has

[1] The judgments of philosophers about the unity of the universe are certainly no exceptions to this. For they are, in fact, of a highly selective character. They never aim at including literally everything, at reproducing every blunder, every imperfection, every silliness, every frivolity, and every atrocity of reality. The more convinced a 'monist' is, the less is he likely to admit that the errors also of his 'pluralist' adversaries must be thought by him to be essential to the rationality and perfection of the universe; the more solemn, the less willing will he be to say as much for every triviality and every joke. The 'unity' which evokes enthusiasm is therefore only a very small part of the totality; so small, indeed, that it is often so construed as to omit everything that is of real importance in the eyes of ordinary men.

been carved out of the plastic mass of crude experience, and hardened by use and usage.

Let us be frank, and cease to deceive ourselves. Whoever denies us (and himself) the right to be thus 'arbitrary' can have nothing more to say to our procedure. But life and science will have nothing more to say to him. For *all* their 'facts' are similarly generated, and are products of repeated dissections and selections. They exist only in virtue, and in consequence, of acts of attention and volition, which discriminated them from their matrix.

There is never, therefore, a problem of *connecting* 'facts,' as upon the theory which Hume uncritically took over from common-sense, Kant, still more uncritically, tried to turn into a theory of knowledge, and the post-Kantians, most uncritically of all, into metaphysics. The 'facts' of common-sense should never have been taken for granted. They are the achievements of long ages of human analysis and experiment. Philosophy should have seen this and seen that in reality they are still floating in a continuum from which they can never quite be severed, and are only lifted out of it for our varying purposes by a voluntary effort. Divert your attention, change your purposes, and leave them to themselves, and they sink back into the whole you were trying to control by singling them out. The real problem, therefore, is always whether what has been taken as a 'fact' will really function as such for the purpose of the inquiry, whether the course of events will condone or ratify our interference with it.

'Facts' then are *not* 'given,' either as 'causes' or as 'effects,' or even as 'events,' but have always to be 'made,' and confirmed by the successful working of our selections. Doubtless that is not the way the world now presents itself to common-sense. Even the stupidest and least resourceful knower now has at his disposal many modes of operating on experience, and so of making 'facts,' which are easy, and familiar, and traditional, and conventional, and convenient, and even inevitable, as

being embodied in the selective functioning of his very organs. They consequently impose themselves on every one,[1] and are so stable that they seem to be veritably 'given.' But even so there is abundance of unformed material and of 'facts' that need re-forming, and it is vital to the life of science that man should ever be reminded of his duty and his powers. If philosophy has not the courage to probe beneath the surface, and dares not tell him that the separateness of his 'facts' is just as arbitrary and artificial, and relative to his needs and his mode of life, as is the separateness of the 'things' he perceives in space, but need be none the less 'real' and valuable for that, it will be conspicuously lacking in the scientific courage shown, *e.g.* by physics and the other sciences in their corrections of common-sense. The social justification of every study lies in the improvements it effects in the crudity of common-sense.

Having made our 'facts,' *i.e.* discriminated and singled out features in the flow of experience which we venture to judge relevant, we proceed to a further big assumption. Though we see that the 'facts' are all really immanent in the flux and 'parts' of it, we nevertheless assume that for our purposes they may be handled apart, either because its nature is so peculiar that their immanence does not impair their independence, or because its influence is irrelevant to our inquiry. We assume, therefore, that the integral flow of reality may be dismembered into causal series or chains which pursue each their own course without mutual interference. It is evident that for purposes of prediction and control this is a very convenient and essential assumption, because it is only so that the search for partial 'causes' can be justified. But it is no less evident that it implies a disregard of the unity of the universe. And antecedently it seems, of course, improbable. It seems strange that the way to analyse experience should be to treat its flow as a tangled coil of causal strands; but the procedure

[1] His own existence as a distinct entity, and that of others, are striking examples.

cannot be objected to as being too great an interference with the given. It was taking at least as great a liberty to substitute a disorderly plurality for an undifferentiated unity.

The reply in either case is that what we do has the sanction of success; improbable as our assumptions sound, they work, nor has any one as yet devised anything else that does better. The objector, therefore, should either submit to this mode of proof or try to dispense with causal analysis: to use it because he must, and yet vindictively to call it false, because it shocks his *a priori* prejudices, is dastardly.

But it follows of course—and accords excellently with what we have everywhere found to be the nature of real reasoning—that there is always *variety* and *risk* in the selection of our 'causes' and 'effects.' And it is quite right that these features should be found here. They should not be eliminated as contradictions, but their functions should be understood.

The variety of 'causes' that may be alleged for the same 'event' essentially means that the event is an object of interest for many, and capable of entering into a variety of systems of purposes. It is accordingly viewed with different eyes, and different features in it are selected as 'essential.' All these selections may be right or may be wrong, but they are all possible, and involve no intellectual contradiction. It is no more impossible, 'contradictory,' or inconsistent that the same course of events should be analysed variously than that the same alimentary substance (*e.g.* pork) should be one man's meat and another's poison. Socially and scientifically, therefore, this actual plurality of analyses must be recognized. That does not, of course, prevent any one who pleases from conceiving an ideal of an ultimate unification of purposes such that all will always be aiming at precisely the same ends and accordingly analysing and perceiving everything alike. Whether this ideal strikes one as inspiring or depressing is entirely a matter of taste. At any rate it forms no reason for

closing one's eyes to the actual facts and denying the existence of a plurality of causal analyses and their relevance to the purposes actually cherished.

Similarly the existence of a *risk* in causal selection should be emphasized, and not denied. For it is precisely what gives a motive and a zest to our procedure. The first risk we take is in the selection of the 'effect.' Are we picking out an 'event' which may be treated as 'effect' for which we can analyse out a 'cause'? There's the rub. Experiment alone can yield the answer in the course of experience. If the answer is propitious, all is well. We have really got at the real 'cause' of a real 'effect.' If not, there remains a doubt. Either the 'cause' or the 'effect' may be suspected as a bad selection. More frequently it is the 'cause' which is suspected to be wrong, because of its inability to give the desired knowledge of the effect's behaviour. We are usually pretty clear about the 'effect'; we know where the shoe pinches long before we discover the why of this unpleasant interruption of the routine of our life. But that this is a prejudice is strongly suggested by the history of science, which has often shown that the unanswerable questions were only those which had been wrongly put.

Both the selection of the 'effect,' therefore, and the selection of the 'cause' must be conceived as *fallible*, and therefore 'risky.' But they may yield real truth for this very reason, *because* they rest upon interferences with the 'given' and 'arbitrary' decisions. If causal analysis could be infallible in virtue of its mere form, it would be incapable of answering real questions, of yielding real truth, of possessing real meaning. Formal Logic, as we have seen (§ 2) and shall continue to see, does make its usual attempt to secure formal 'infallibility,' and arrives at its usual failure to secure real meaning, by destroying the distinction between 'cause' and 'effect' in the tautology of an 'identity' which denies difference. But its lucubrations are irrelevant to the real work of the sciences. In this our best earnest of success lies in the

opposite policy. We should be fully aware of what we are doing, and instead of concealing and disclaiming our essential arbitrariness and our inevitable risks, should boldly recognize them, and be thankful that we had the courage to re-make the given.

To sum up, then, the reply to the philosophic critic of the practice of causal analysis is that in essentials the practice of common-sense and of the sciences is right, and right for the best of reasons, because it works. The only misconception to which it may give rise is that of taking 'causes' and 'effects' as ready-made and given facts. But though they cannot be this strictly, ultimately, and absolutely, there may be no harm in taking them thus for the purposes of a particular inquiry. All the rest is defensible, and indeed necessary. That the 'effects' and 'causes' concerned should be 'partial' and 'plural' is no defect, but an essential presupposition of the use of causal analysis. That they should rest on what the critic calls 'arbitrariness,' and we 'selectiveness,' is inseparable from all our cognitive procedures, and can only be got rid of by repudiating them *en bloc*. That it always means a risk, because we may always select the irrelevant and miss the relevant, is true; but it is not regrettable, because it is just in the taking of such risks successfully that the good reasoner differentiates himself from the bad.

§ 4. *The Derivation of Causation:* (1) *from Experience*

In vindicating our working conception of Causation we shall be found to have settled also the vexed question of the *origin* of the causal principle. If the account we have given of its function is correct, it can neither be a generalization from experience, nor a self-evident intuitive truth, but is clearly a postulate we have devised to operate upon the flow of happenings. But it can do no harm to show this more explicitly.

I. The impossibility of the *old empiricist* account of the origin of the causal principle may be shown in various ways.

(*a*) It follows implicitly from Hume's proof that causal connexion is not an observable fact *in rerum natura*. For if it has first to be read *into* the facts before it can be extracted *from* them, how can we say we *found* it there? And if it is nothing but an expectation produced in us by association, how can we ascribe to other things a similar idiosyncrasy? The more clearly its 'subjectivity' is brought to light, the more miraculous it becomes that our fiction should work, and the less possible that it should be a mere 'fact.'

(*b*) The impossibility of the empiricist account may be inferred also from the intrinsic embarrassments and inconsistencies of the doctrine itself, which does not even succeed in formulating itself unequivocally. Thus (1) it disclaimed belief in 'necessary connexion,' and yet defined the 'cause' as an *invariable* antecedent. Now 'invariable' means 'that which *cannot* vary,' and 'empiricism' means that we are not to speculate in advance of the facts: how, then, can it have cognizance of more than an observed absence of variation, and how can it infer an absence of a 'power' it had declared to be an illusion? Clearly the transition from 'unvaried' to 'invariable' is beyond its power.

(2) How could mere observation of the succession of events ever generate a belief in their more intimate connexion? If the belief in causality is supposed to have ever been absent, no experience could produce it. We can still see this in the case of sequences presumed to be casual, *i.e.* devoid of any connexion between their successive 'events.' They afford no basis for expectation; and hence nothing in their empirical character, not even the greatest regularity, ever leads us to regard them as more than casual; or else, if we do argue that their regularity must mean something, it is precisely because and in so far as we have retracted the belief that they are casual. This *we* can do, because we are familiar with the notion of causal connexions; but it would have been impossible to a mind which had not yet discovered their existence. Hence it follows that no sort of experience

could ever force the principle upon us, because it could never be proved to be caused until it had been assumed to be so.

(3) Even if we assumed that the belief in causality had somehow been arrived at by men, *e.g.* (as was probably the fact) by acceptance of the immediate experience of voluntary motion, yet to a mere empiricism this would afford no reason to believe that anything more, and still less that everything, was caused. For in the earlier stages of man's control of experience it must seem just as manifest that most things are capricious and incalculable and *uncaused*, as that a few things are regular and calculable and 'caused.' Why, then, should a wholly disinterested and indifferent observer, such as the old empiricism loved to postulate, fly in the face of the facts, and suppose that the bulk of phenomena were not such as they seemed? His mere observation of the fact of causation in himself would give him neither a motive nor a right to destroy the distinction between the casual and the causal, and to strive to extend the dominion of the latter over the whole of his experience.

(4) Lastly, if the habit of causal analysis rests merely on experience of the past course of events, it will not justify any prediction about the future, nor in general, about the unknown. Strictly we can only say that those events which we *have* observed *were* caused.[1] We cannot say how events will behave beyond the range of our knowledge.[2] Nor will it help us to descant on the intensity of our expectations of a continuance of the regularity we have experienced. For that is merely psychology, and to expect the world to behave everywhere

[1] And even then, if the hitherto observed sequence A – B should at any subsequent time turn out not to be 'invariable,' our principle would tempt us to deny that A *had ever been* the 'cause' of B.

[2] Mill at times confesses this; cf. his famous doubt whether the law of Causation could be confidently affirmed to hold 'in distant parts of the stellar regions' (*Logic*, iii, 21, § 4). But he does not appear to have seen that he was thereby stultifying the law for the primary purpose of arguing from the known to the unknown, nor that the restriction of his empiricism to actual observation was precisely what the *apriorists* objected to, when they complained that no true universality could be extracted from experience.

and always in the way to which we are accustomed is merely to beg the question.

(*c*) But the most convincing method of exhibiting the error of this theory of causal analysis is undoubtedly to show that in point of fact it cannot account for our actual procedure. It cannot explain the selection of the 'facts,' of the 'events' which form the effects to be investigated. Nor can it explain the choice of the antecedent which is accepted as the 'cause,' nor the variations in that choice. The whole of our 'arbitrary' manipulation of the given must seem to it hopelessly indefensible, and its actual success an insoluble mystery. That in point of fact we never hesitate for a moment before demanding a 'cause,' however distant in space and time, for any 'event,' which we are interested in explaining, must seem to it utterly inexplicable. In short, the old empiricist version of the derivation of our principle is plainly insufficient.

§ 5. (2) *Is Causation a 'Necessity of Thought'?*

II. But does it follow that the rationalistic version must be adopted? Its advocates have always been desirous of inferring this. They have agreed that inasmuch as the principle was scientifically necessary and empirically unexplained, it must be justifiable as an intuitive, self-evident, or *a priori* axiom, and accepted as an ultimate 'necessity of thought.' This plea was never even formally cogent; for it does not follow that because one explanation is wrong another must be right, nor that because no one up to date has thought of a third alternative, such an alternative may be treated as logically non-existent.[1] And in view of the actual character of the rationalist conception the logician's choice at the best of times was between the devil and the deep sea. Now, however, that a far more efficient alternative has for some time been in being, continued adherence to the *apriorist* theory

[1] Practically, no doubt, it is good policy not to anticipate trouble, and to say *de non apparentibus et non existentibus eadem est ratio*. But that is only a counsel of prudence necessitated by the limitations of our science and our foresight.

can only be ascribed to the glamour of the unintelligible. For the truth is that this theory is neither (*a*) an explanation, nor (*b*) a justification, of our procedure, nor (*c*) consistent with the facts.

(*a*) It is no explanation to say that the principle of causality is an ultimate necessity of thought. It is merely a refusal to allow it to be investigated further. It may, of course, be that at this (or any other) point we have reached our limit and can discover nothing more; but it is both dogmatism and bad method ever to *assume* this. For suppose that we thought we had reached the ultimate fact, but were wrong; should we not have debarred ourselves by our arbitrary and foolish assumption from discovering anything further? Hence such things as 'intuitions,' 'necessities of thought,' 'ultimate facts of mental structure,' etc., should only be regarded as provisional halting-places of the scientific analyst and permanent structures of dogma should not be built upon them.

(*b*) Even, however, if it were conceded that the causal principle was a structural necessity of our mental constitution, would it follow that it was true, and that its working could implicitly be trusted? It seems impossible to infer this. For in itself, and until it is confirmed by experience, the principle would be merely a psychological fact (even if universal) about the nature of the human mind. And what is to guarantee that this fact is to help us in acquiring knowledge? It might be a universal delusion, a flaw in our minds analogous to the defects of our senses, like the astigmatism of the eye. It might be only a pernicious prejudice which hampered us in the acquisition of truth. Or again it might be useful and serviceable on the whole, without being infallible. If so, it would have to be appealed to with discretion. The question, therefore, whether and how far the course of nature conforms to the structure of our minds is initially an open one, and should be treated as such. To start with what is patently a psychological fact, and to convert it *a priori* into an absolute principle, seems a reckless procedure, the more so

that after all no answer has been forthcoming to Hume's objection to the assumption of a 'necessary connexion' between the 'cause' and the effect. For clearly there has been no independent proof that the connexion exists objectively in the events, nor any explanation of what it means; and to assume that it is valid, because it has been read into them from the mind's structure, is merely to beg the question.

(*c*) As regards the ability of the *apriorist* theory to account for the facts of our causal analysis, it must be admitted that it can account for some points that nonplussed the empiricist. If we are so constructed as always to import the idea of causation into our experience, it is a matter of course that we shall regard it as universal, and have the utmost confidence in it, until at least we learn from experience to distrust it. But there remains a long list of facts which the rationalist theory is quite unable to account for.

(1) In the first place, what about the distinction between casual and causal sequences? When we recognize a sequence as casual, or even debate whether it may not be so, why are we not necessitated to import causality into it?

(2) What about the future? What is to guarantee on this theory either that our mental structure will remain unchanged so as to continue to import causality into its view of experience, or that the course of nature will continue to conform itself to the nature of our mind? Rationalism here seems as impotent as empiricism. It can never give us an indefeasible assurance so long as it dares not deny the possibility of change. And if it denied that, would its dogmas continue to be applicable to the world of our experience?

(3) We have seen already (§ 3) that the actual procedure of causal analysis was anything but self-evident. It struck the rationalist as to the last degree arbitrary, improbable, and risky, and we had to admit that, on his assumptions, it must seem so. And much as we should like to spare his feelings, we must now go on to insist

emphatically that, so far from being intuitively certain and rationally self-evident, the procedures of causal analysis are the very opposite of this.

(4) They are triumphant paradoxes, and unmitigated eyesores in the eyes of the rationalist. The dissection of the given, the 'making' of 'facts,' the selections of 'causes' and 'effects,' their relativity and variety, the preference for the partial and the plural, the apparent setting aside of the whole, the dependence of the whole process on the personality and purposes of the knower, are so many incomprehensible outrages upon his sense of cosmic rationality and propriety. Yet how can he deny them to be facts? If it is true that human interference does nothing but vitiate 'fact,' then the theory of Causation is certainly one of the most magnificently irrational parts of an incredible scheme of things.

§ 6. (3) *Causation derived from Postulation*

III. It is clearly time that we betook ourselves to the third alternative, if we are not utterly to lose our faith in the rationality of the universe. After all the causal principle may be a postulate, confirmed and rationalized by experience. We have seen (Chap. XVIII, § 5) that postulation is a well-defined and typically human way of obtaining general propositions which, when they have been sufficiently verified in use, may attain the highest degrees of certainty and be looked upon as *axioms*. Now the principle of causation is one of the most valuable and characteristic of our postulates, and when its genesis and function are properly understood it can easily account for all the facts that were such stumbling-blocks to the rival theories.

(1) It is, of course, natural and proper that a postulate should involve human interference with the given and anticipation of experience, and also that it should be condemned as arbitrary and hazardous by theories which close their eyes to the volitional inspirations of our thought. But the dissections, selections, and choices which dis-

tinguish causal analysis are quite in accord with a voluntarist view of our knowing which recognizes the essentially *selective* nature of thought.

(2) Conceived as a postulate the principle of Causation combines the strength and avoids the weakness of its two competitors, and is far more plastic and adaptable than either. It possesses the 'strict universality' and 'independence of experience' of the rationalist view.[1] For it is not tied down to past observation and paralysed by a congenital incapacity to advance a step beyond it. All it requires is that experience should somehow have suggested its postulation, and it can then develop into as universal a demand upon all subsequent experience as any one can desire. Yet it remains far more intimately connected with experience than a mere necessity of thought could presume to be, and is not exposed to the danger of total alienation from fact which besets the latter. And withal it has not the unbending rigidity of an unalterable fact either of mental structure or past history.

For (3) it is precisely as universal and necessary as we want it to be, and is applicable precisely so far as we desire to apply it. Hence there is no difficulty or inconsistency in the practice of discriminating between casual and causal successions, and of recognizing the existence of the former. A 'casual' series of events is either one to which for some reason or other we refuse to apply the causal postulate, or one which we purpose to analyse into a number of distinct causal series.

(4) We can thereby explain also, what would otherwise seem an inexplicable fact, that in the past the causal principle was not applied to *all* events. If 'cause' is a postulate, whatever is not an object of interest to any one can be calmly left without a 'cause,' or if a question is raised about it, 'chance' may be the 'cause' assigned to it.[2] This explains also why a certain realm of 'contingency' finds a place even in highly rationalistic philosophies. Similarly, wherever there seem to be

[1] Cf. "Axioms as Postulates," § 11, *Personal Idealism*, p. 69.
[2] Even Aristotle regularly enumerates 'chance' in his list of 'causes.'

reasons for not applying the postulate, the validity of its application may easily be disputed. For it is possible to cease using the postulate, and as easy to stop postulating as to begin it. So when questions are raised as to what is the 'cause' of God or of existence in general, the causal demand is wont to be vehemently called to order by the very philosophers who had previously magnified it as an inexorable necessity of thought. But the clearest example of this is afforded by the Free-Will Controversy, in which strong moral reasons seem to demand for the will an exemption from the law of causation.[1] It is not, of course, the logician's business to settle such disputes; but he should observe their existence, and explain how they can arise.

(5) The only feature about our causal analysis which is not easily and obviously explained by treating it as a postulate, is the fact of its extension to the future without any apparent diminution of the confidence placed in it. But a little reflection will show that this is precisely what ought to be expected of a postulate. Postulates always refer to the future; they are always in a sense attempts to 'bluff' experience; they all anticipate further confirmation. But they are quite frank about it and do not pretend to be more than the assumptions they are. Hence the uncertainty as to whether such confirmation will accrue, which was so fatal an objection to the rival theories, can make no difference to them. If they are genuine postulates, and methodological necessities, *i.e.* if we really need them and can obtain no better guarantee, we must continue to act *as if* they would hold, however much we may fear that they will not turn out to do so. Now in this case it is obvious that we should gain nothing by assuming that in future the course of experience will be such as to defy causal analysis; hence the impossibility of proving *a priori* that it will not baffle us does not affect the confidence with which we contemplate the future application of our postulates.

(6) Lastly, by conceiving the causal principle as a

[1] Cf. Chap. XI, § 8 *n.*, and *Studies in Humanism*, chap. xviii, §§ 3-5.

postulate, we escape what would otherwise be a fatal objection to its use and its truth. If its use is supposed to be obligatory, either because it inevitably comes out of experience or because we cannot help applying it to experience, it follows that we can never legitimately *stop* applying it. And so the causal principle from being our servant becomes our master, and thereupon both torments us and stultifies itself. For no 'cause' we arrive at will now afford us rest and satisfaction. We shall always be driven further back and have to ask, 'What is the cause of *that*?' But this would be to render all 'causes' illusory and all causal explanation futile. Whereas, if we realize from the first that 'cause' and 'effect' are both selections made for the sake of human interests, we shall never embark on this infinite regress, nor pursue this will-o'-the-wisp of a 'cause' which claims to be absolute for all purposes, because it is related to none. We shall be enabled and entitled to stop wherever we please, wherever, that is, we have arrived at a 'cause' which suffices for the purpose of the inquiry. And again we find that what our theory sanctions is only what is in fact the practice of science.

The *origination* of the causal postulate presents no special difficulty. It is clear that a being which is incapable of handling experience as a whole must devise some means of analysing it, if it is to live. The principle of Causation is the device which man has adopted. Its adoption was doubtless suggested by the experience of voluntary motion, and its extension was fostered by the attribution to all nature of vague forms of animation. Its vogue was certainly facilitated by its vagueness, which disposed men to accept almost anything as a satisfactory 'cause' of events. Beyond asserting the possibility of some analysis and a possibility of some control, the causal postulate commits us to nothing in particular.

Persons, things, gods, devils, laws, miracles, antecedents, ends, science, magic, chance, appealed to conjointly, separately, or vicariously, were all considered capable of functioning as 'causes' and explaining the course of

nature. A 'cause' was in fact anything that could be supposed to aid in the forecasting and control of the flux, anything that could serve, in idea or in fact, as a clue through the labyrinth of life. And to this day great vagueness clings to the notion, as we shall see in discussing the formulations of the principle in the next section. As William James aptly says,[1] it is "an altar to an unknown god, an empty pedestal marking the place of a hoped-for statue." Or perhaps it is rather a pulpit whence a number of doctrines make their appeal to man. At any rate there can be no doubt that the identity of the word 'cause' is often all that cloaks profound differences in the methods of operating on experience.

This intrinsic vagueness and variability of our postulate renders it difficult to determine to what extent it is really valid, *i.e.* succeeds in analysing our experience. In a general way, of course, the universality of its use attests its value, and the primary importance of the methodological need of causal analysis is clearly beyond dispute. But so long as men are content to let so many different things count as 'causes,' and accept even verbal and illusory 'causes' in preference to nothing at all, how shall we detect how any one view of causation really works in detail? We should remember how hard it is to displace postulates which have become axiomatic (Chap. XVI, § 10). And yet we must never forget that unless a principle is such that it can also be *disproved* by its workings, it does not *apply* and cannot really be tested or proved, nor be really true. The principle of Causation in general certainly comes perilously near the border-line which separates the axiomatic from the unmeaning; just because it applies to all things and means various things to various men, it means and guarantees so little in particular. What do we really learn about the world by being told that 'every event has a cause,' if anything may be a 'cause'? But perhaps it will be replied that the fault lies in the looseness of formulation to which ordinary thought is

[1] *Principles of Psychology*, ii, p. 671.

prone, and which philosophy usually contrives to aggravate; and that in science at least causality has a definite meaning to which logic should restrict itself. By all means let us accept this suggestion, and examine how the principle is formulated for the use of science.

§ 7. *Formulas of Causation*

It may seem strange that we should all this time have neglected to consider how the principle of Causation is actually formulated and what it actually asserts; but the omission was intentional. It seemed better first to discuss the problems which cling to it however it is formulated, and to bring out incidentally the great varieties of meaning it is made to cover. For this experience may dispose us also to perceive that the same difficulties persist to a serious extent in what the logician considers the scientific formulation of Causation.

The 'Law of Causation' which figures in Inductive Logic is in reality a very complicated affair. It is usually identified with the principle of the *Uniformity of Nature*, which is itself by no means a simple conception. The need for further analysis will appear if we make a list of the conceptions implicated.

(1) We need a *definition* of 'cause.' Now that a 'cause' is *something* which makes the 'event' intelligible and gives us control of it, is agreed. But beyond this there is no agreement as yet, even in the sciences; a 'cause' is variously conceived as an antecedent, or a consequent ('end'), or a law, or a power, or a person, or an identity. It is clear, therefore, that so far our principle tells us next to nothing.

(2) We make the *existence of* '*causes*' into a postulate. But here we must be careful to choose the right formula. Shall we say *every thing has a cause* or *every event*? Common-sense does not hesitate to say 'thing,' but science is more wary. The postulate is, in fact, meant for use upon events, so why assert more? Moreover, by restricting it to events we may escape the awkward

puzzle about the infinite regress of causes. So long as we extend the causal demand to every 'thing,' every 'cause' we find must be treated as the 'effect' of an ulterior cause, and no cause in its own right is ever attainable. It consequently begins to look as though our principle was fooling us. Whereas, if we stop short with 'events,' we are not committing ourselves to more than a human manipulation of experience, and can rely on the purposive selection of the event to cut short the regress of 'causes.' Causal inquiry will then legitimately stop wherever we reach a 'cause' which answers the question we raised about the 'event.'

But however skilfully we formulate our postulate it does not carry us far. To declare that 'every event has a cause' is only to express a general desire, and to claim a general right, to investigate events. It does not bring us perceptibly nearer to discovering what is the cause of any particular event. And what right have we *to assume that there are 'events'*?

(3) This assumption is evidently prior to the assumption that events have causes. Yet the current accounts of the Law of Causation pass it over in silence. It should be made explicit, and is evidently a postulate, which is false if it is supposed to reproduce reality, and true only if it is meant to substitute a conceptual order for a perceptual chaos.

(4) Another omitted postulate refers to the relation of cause and effect. It assumes that the 'effect' is dependent on its 'cause' alone, and that the cause is productive of its effect alone, or in other words that the causal relation is entitled to abstract from the rest of the universe as irrelevant. That this postulate is essential to the validity of the causal analysis we have seen (§ 3). Without it there would be no analysis, and 'cause' and 'effect' would lapse into meaningless tautology.

(5) As a sort of compensation for neglecting to notice these two important postulates which are necessary to the working of the 'Law of Causation,' the logician has declared that Science demands two further postulates,

which may be called the *Uniformity of Causation*, and the *Reciprocity of Cause and Effect.*

The former asserts that 'causes' act uniformly, *i.e.* that the *same* 'cause' will always produce the *same* 'effect.'

(6) The latter demands the converse of this, viz. that every 'effect' always has the *same* 'cause,' *i.e.* that the effect 'reciprocates' with the cause, and that, therefore, there is not really any 'plurality of causes' (cf. Chap. XIX, §§ 5, 9).

Both these assumptions are quite debatable, and indeed in a way untrue, so before we discuss them let us complete our list by mentioning a further principle, (7) the *Uniformity of Events*, which, together with the other six, makes up what is called the 'Uniformity of Nature.' This principle must be carefully distinguished from the *fact* (if it is a fact) that the course of nature is uniform or regular. For it is a postulate which demands what an actual uniformity of events would supply, and as such is really an extension of the (third) postulate that there shall be 'events.' It adds the demand that these events shall be of a certain character, viz. regular and 'uniform.'

It is evident that this is scientifically a postulate of the greatest importance. Without it the other postulates would not amount to a demand for a scientifically knowable world. To postulate that there are 'causes' and that there are 'events,' and that all 'events' shall have 'causes' and depend on them, and that causes shall act uniformly and be convertible with their effects, all these things are vain, unless 'events' are also to be regular. For if the course of nature were such that the same 'events' never recurred, the same 'causes' could not be expected, and *vice versa*; moreover, the postulate of the uniformity of causation by itself could not secure a regular recurrence of events. It would not necessarily be falsified and might remain hypothetically true, but it would become more or less inapplicable to the actual world. *I.e.* it might remain an indefeasible postulate

that *if* the same 'cause' occurred the same 'effect' would ensue, and yet every 'cause' might be such that it could never be treated as the 'same' with any that had occurred before. The uniformity of causation, therefore, would become an idle postulate, and a logician who held that truth ultimately involved application to experience would even have to deny its claim to be true. The addition, therefore, to our array of postulates made by the 'Uniformity of Events' is essential, and it is difficult to find excuses for the logicians who have thought either that it is covered by the 'Uniformity of Causation' or that it can be dispensed with.

All these postulates together, or such of them as it may seem on reflection possible to maintain, have, of course, to make good their claim to be applicable to the actual course of nature. But this is not a question that can be settled by making postulates, however strenuously; it depends on experience, and, as we urged against the rationalist theory, must always continue to do so. For even if they hold good up to date, it is always conceivable, though never presumable, that nature may become more recalcitrant to our postulations.

§ 8. *The Uniformity of Causation*

With regard to this postulate there are, however, further questions. We have seen that in itself it is impotent. Unless it were backed by the Uniformity of Events, the belief that 'same' causes would have 'same' effects would remain purely academic. But is even this much either necessary or even true in fact? Must we assume that when we allege the 'same' cause we must expect the same effect? And do we in point of fact always do so?

The fact that such doubts can be raised would seem to show that the principle is not self-evident, and its actual validity would appear to be still more doubtful. Indeed experience seems continually to refute it. The expectation that history will repeat itself seems destined to

frequent disappointments. Experience, therefore, affords ample ground for challenging the assumption. How shall it be defended?

It is tempting to 'prove' it by arguing in a circle. It is so easy to say, when confronted with a difference in the 'effect' of what had seemed the 'same' cause, 'Oh then the cause must have been different.' But this *ex post facto* judgment is not available for scientific inquiry. A logic that professes to describe the procedure of actual knowing must not descend to such devices, which indeed seem mere tautologies, when the causes are really the 'same,' while if they only *seem* 'the same,' they must not be allowed to divert us from the real question, viz. when may we take the temptingly similar effects as really 'the same'?

A more tenable reply is suggested by the fact that the principle is a postulate. We may retort: 'Well, why should not the same cause have the same effect? If you admit that the cause is the same, why should you expect the effect to be different? Is not our postulate easier, simpler, and more reasonable than to suppose that causes produce different effects for no reason at all? In saying this we are not forgetting that the identity of the "cause" is always a hypothesis, relative to the purpose of an argument. Nothing ever remains absolutely the same for two moments together. We admit that identity without difference is a myth and an impossibility. But for this very reason it is meaningless to ask whether "same causes" are to be asserted in this sense. The identities we assert are never found, but made (Chap. X, § 10), and in making them we take a risk. But it is likewise true that in making them we *mean* them to be stable, and certainly do not desire to sacrifice them to any idle doubt. In the real meaning of an argument from identity, therefore, there is always an implication that the differences between the "cases" of the "same" cause are irrelevant, and that therefore the argument will hold. This you cannot dispute, while if you wish to dispute the argument, why not dispute the identity it asserts and

deny that the differences between the cases can rightly be ignored?'

All this is sound enough. It is clear that we could have no interest in asserting the existence of a 'cause' of which the effects were wholly indeterminate and indefinitely variable. Nor in fact do we ever do so. But this hardly proves that the 'effects' of a 'cause' must be regarded as wholly determinate. What if there are cases in which, for other reasons, we are desirous of asserting causes capable of producing alternative effects? We have plausible reasons to do so in the case of 'free' actions, which we conceive as not wholly determined: shall we deny that such 'free causes' are conceivable, or deny that they invalidate the postulate of the uniformity of Causation?

Perhaps we may escape from this dilemma by observing that there is no need to conceive the alternative 'effects' as *incalculable*. If we decline to make this gratuitous assumption, we can suppose that the indeterminate 'cause' C is such as to produce either E^1 or E^2, but not anything and everything. We can then forecast *both* the possibilities and prepare ourselves for either.[1] It is true that a cause which produced only E would be *simpler*; but it is not on this account more calculable. This sufficiently explains why science naturally prefers to begin by assuming the complete determination of the effect by the cause. But it is untrue to say that this is necessarily postulated, or that, if it were not, causal analysis would have to cease. It would cease only if the effect were wholly indeterminate. But in that case what would be the sense in discriminating it?

We see, then, that the Uniformity of Causation, though it enunciates a sound methodological rule, is by no means the absolute and intractable principle that has been supposed. Instead of guaranteeing the uniformity of events, it is the latter which gives it a meaning and a status in the world of reality.

[1] Cf. *Studies in Humanism*, chap. xviii.

§ 9. *The Reciprocity of Cause and Effect*

The claims of this postulate are still more difficult to defend, because the resistance which experience offers it seems to render it scientifically so useless as to cast a doubt on the propriety of postulating it. We shall do well, therefore, to consider first the cogency of the reasons for making the postulate.

It seems, in the first place, that it would be a great convenience if we could discover 'causes' which reciprocated completely with their 'effects.' For then we could by noting the effect at once divine the cause; or if we knew the cause, could feel assured of the effect. It is possible, however, to exaggerate the importance of this convenience, because after all it would not get rid of the risk in *selecting* either the cause or the effect; what would be the use of knowing that the true 'cause' was convertible with its 'effect,' if we felt no certainty that we had in fact truly analysed out the cause?

A second reason appeals more especially to Formal logicians. Their whole theory of Induction depends on the assumption that reciprocating causes can be discovered, and that effects are not due to a plurality of 'causes' capable of acting vicariously. Unless this is granted, their methods of elimination are helpless and false. They all notoriously assume that what can be eliminated cannot be the cause, and that what cannot be eliminated must be the cause. But both assumptions break down if the same 'effect' may be produced now by one 'cause' and now by another, or in part by the one and in part by the other, while some irrelevant incident is substituted for the true causes, because it is persistent. Thus, symbolically, an inquiry conducted according to the Canon of Agreement (Chap. XIX, § 5) might infer from *N*ADC—*a*bc, *N*ADE—*a*de, and M*N*BC —*a*bc, not that A was the cause of *a* in the first two cases and M in the third, but that the irrelevant circumstance *N* was the cause throughout. Similarly two successive

experiments by the Method of Difference might yield the results ABC—*a*bc, BC—bc and MBC—*a*bc, BC—bc, whence it would not seem certain that A was in general the cause of *a*.[1]

Formal logicians, therefore, have to choose between correcting their Canons by restricting their applicability to cases where there is no 'plurality of causes,' and abstracting from applicability altogether. The second alternative has so far surpassed their powers. The first, which commended itself to those who, like Mill, were still solicitous to remain in touch with the facts of science, is open to the fatal objection that the absence of plural causes *can never be assumed*. Hence Mill's supposition that sufficiently extensive observation will indefinitely diminish the probability of plural causes is inadequate. The progress of knowledge by demanding subtler distinctions and greater refinements engenders as much plurality as it removes. To be Formally safe, therefore, reciprocating causes must be relegated, or elevated, to an ideal world altogether. This is what the more rigidly Formal logicians have seen; they simply declare that, whether or not they are attainable by man, they constitute the ideal of scientific knowledge.

Now if the assertion of any thing as an 'ideal' were merely a euphemistic way of denying its reality, it would have to be conceded that the case for postulating 'reciprocity' was quite convincing. But if ideals cannot be wholly severed from all relation to experience, the working of a postulate must reflect on our right, or at any rate on our policy, in making it. And an 'ideal' which it is impossible to realize in practice, and which, if assumed in theory, has the effect of blocking scientific inquiry, does not seem to have an indisputable claim to figure as the 'ideal' of science. If philosophers insist on regarding it as the ideal of their philosophy, it is difficult to prevent them, but it may fairly be considered to be the final condemnation of that philosophy.

[1] If the argument is content to prove that in the first case A caused *a*, it gives up the claim to generalize.

Now such appears to be the position to which the ideal of a reciprocating cause conducts, and the fact that logicians have not clearly seen this, must be due to their antecedent conviction that 'plurality of causes' is nothing but a preliminary obstacle to scientific research, and not a normal incident in its progress. But this only means that they have not seen it is normally one of the *products* of research, and that, therefore, no method of *research* can ever set it aside as irrelevance. On the contrary it must always conceive the 'effect' studied to be capable of further analysis, and the 'cause' assigned to it as therefore potentially 'plural.' For it is inevitable that at first only the general outlines of a problem should present themselves to our intelligence. Hence the 'effect' selected for study will be relative to a broad and comprehensive purpose which has *not yet* been specialized. The medical man inquires into the cause of 'disease,' the biologist into that of 'life.' But as they go on and come to closer quarters with their subject, their 'facts' multiply and ramify, and grow more complex. They find that 'diseases' and forms of 'life' are *many*, and that what is true of one is not necessarily true of another, and that in consequence their original questions have become too ambiguous to be answered. To work effectively, therefore, they must restrict themselves to a single 'disease,' say cancer, and to a single form of 'life,' say sea-urchins, and then they find that they can spend their whole life in studying the 'forms' of these.

Is it not quite unscientific, therefore, to assume that this process can be cut short anywhere, and an 'effect' 'E' secured, which will never need to be discriminated into E^1 and E^2 by any future growth of knowledge? But if the analysis of 'effects' may go on indefinitely, so must that of 'causes,' and a 'cause' 'C' so uniquely adequate to its effect as never to develop plurality and to split up into C^1 and C^2, can never be assumed. All the pretty Methods of Formal Induction, therefore, which are based on this assumption, are radically vicious. For they are inapplicable to the actual data of Science, and impossible

as its 'ideal.' For how can it be the ideal of Science to stop inquiry?

Yet the opposite policy seems to promise as little satisfaction to the Formal logician. Where, he may justly ask, is this constant splitting up of effect and cause to stop? Will not your 'effect' ultimately be a wholly individual affair, referable only to an equally individual 'cause'?[1] And how can any one *generalize* from such a state of affairs? (§ 2). A 'cause' that reciprocated with the 'effect' in its full particularity would occur once and never again; and what would be the good of that to Science?

None whatsoever, we shall reply, but we are surprised to hear *you* urging this. For the difficulty is of your own construction, and fatal to *your* conception, not to ours. Why, if you saw all along that 'cause' and 'effect' must be *selections* to have any scientific meaning, did you insist on holding that the cause must be the complete ground? Why, if you thought that selections were permissible, did you denounce the making of a plurality of selections, and ignore their makers? Why, if you saw that causal analysis is a purposive process, did you condemn as 'arbitrary' the arresting of the analysis at the point where the inquirer's purpose was achieved? Your attitude seems to us both arbitrary and inconsistent and ineffective. You first insist, in defiance of all usage, that 'cause' must mean what it never does mean in practice. You then refuse to recognize 'plurality of causes,' and declare for the 'ideal' of a 'reciprocating' cause; but when confronted with the facts that such a cause can neither be found nor approved, you turn round and denounce *us* for a conception of 'cause' which stultifies generalization. Yet it is precisely one of the defects

[1] This is the perception which underlies the 'philosophic' doctrine that only the whole universe is the 'true cause,' and that this is identical with the 'effect' (§ 2). If *absolutely all* the circumstances of a 'case' are to be taken into account, and 'identity' is not to rest on selection of the relevant, every case must be expanded until it includes the whole universe. Any 'two' effects (or causes) will then be identical, nay, so completely identical that they cease to be *two*, and to differ from each other and their 'causes.' The difference between the 'effects' and their 'causes' having thus disappeared, it and the logical doctrine based on it will have become purely verbal.

of *your* notion, with which you are now falsely and vainly charging us. Your notion that the cause should be the complete 'ground,' being implicitly a denial that it is a selection, was bound, if thought out, to arrive at a perception that the course of events is unique, and no complete repetition is conceivable. It followed that we could never argue from the past to the future. Now you seemed to see that you had made 'cause' and 'effect' identical, and were proud of it, but not that you had thereby made inference nugatory and induction impossible. And now you try to regard all this as somehow an objection to our view!

But you are utterly mistaken. The procedure of Science has no terrors for us. We have simply to hold fast to the perception that every predication is relative to a purpose. Consequently we can stop wherever and whenever no purpose is served by going on. The theoretic right we claim Science exercises in fact. It does not fritter away its time and strength in investigating questions too vague and ambiguous to be answered, but confines itself to those which hold out a hope of scientific profit. Of course it is quite true that the flow of events is unique, and that its dissection into events depends on a voluntary act. But this very fact is the best and only security that such dissection will not be carried to an unreasonable pitch; it is controlled by a higher purpose. Your theory offers no such security; alike whether you suppose that events are given as discrete, or that we isolate them by an irresistible compulsion, it would logically follow that there is no possible limit to the analysing out of their particularity. You consequently cannot stop until you come to 'effects' so particular that they cannot recur, and therefore are no guides to prediction. In other words, it is impossible to reason from them; and to us this looks like a refutation of the whole intellectualistic basis of your theory.

It does not seem to be true, then, that real knowing demands reciprocating causes. No doubt it often, and indeed usually, treats 'causes' as reciprocating, because

it wishes to argue deductively from cause to effect; but the assumption is never dogmatic and always provisional. There is always a *donec corrigatur* understood, and the conclusions of the deduction have to be confirmed in fact. If the results do not turn out to be satisfactory, we are willing to correct our assumption, and to subdivide the 'effect' and the 'cause' as often as may be required. And it is this willingness thus to learn from experience which is the true ideal of Science.

CHAPTER XXI

LAWS OF NATURE

§ 1. *The Practical Value of the 'Law of Causation'*

THE Formal theory of Induction so far has probably disappointed even the most moderate expectations. Regarded as an account of scientific knowing it yields singularly little information, and what there is of it seems to be pretty uniformly wrong. And yet its discussion of the Law of Causation is the culmination of its philosophic interest. Its remaining topics, such as the Laws of Nature and their Explanation, Observation, Experiment, Analogy, and Hypothesis, are consequential or subsidiary, and receive only perfunctory treatment. It behoves us, therefore, to ask what we have gained, either in reality or in the eyes of Formal Logic, by formulating the Law of Causation. What light has been thrown on the procedure of scientific reasoning, what help has been afforded to the reasoner, by logical 'reflection'?

The answer, however it is regarded, comes to very little. If (*a*) we take the 'Law of Causation' at the valuation put upon it by the logicians, we find that we have not taken a single step towards any real knowledge of the world. For we have learnt nothing save that there are 'causes' in nature, and that any causes we may discover will exemplify the universal 'law' of causation. Our gratitude for this information will be as great as for other *ex post facto* approvals of accomplished facts. When we have discovered a 'cause,' the logician deigns

to acknowledge it, and refrains from denouncing it as a fiction or a miracle. And that perhaps is something to be thankful for, as Formal Logic goes. But have we received any practical help in the investigation of nature? It is difficult to see that we have.

For (1) the 'Universal Law of Causation' is no guarantee of any scientific law of nature. It is only a guarantee that there are laws of nature in general, and this does not even guarantee that they shall be discoverable in general and still less in particular. It is quite possible to hold that such laws exist without supposing that any man can find them out. Moreover, the guarantee, such as it is, is practically superfluous. It is not necessary to assume it in order to discover laws of nature. The desire and capacity to discover particular laws may co-exist with complete indifference towards the Law of Causation. All that is needed is that we should have assumed that something in some sphere of our interest is 'subject to law,' and should then find a formula by which we can interpret the happenings in it. In so doing we need not encumber ourselves with assertions about the whole of nature. Scientifically it makes no difference at all that the investigator of one subject should believe that another (in which he is not interested) is the sport of chance; except in so far as this belief may induce him to confine himself more strictly to his own sphere of the knowable, and so promote his efficiency.

(2) But even if the investigator should prefer to accept the belief in the universality of Causation, he would not get any help from it. It would be perfectly useless, because it would neither supply any clue to the discovery of any particular law nor any means of deciding *which* among the rival formulas that would always present themselves was worthy of adoption as the *right* (or 'true') law of the phenomena. For clearly all the alternatives would equally exemplify the universal law. Thus from the notion of 'Law' no laws are deducible.

(3) It is *not* true, then, that the universal Law of

Causation, as understood in Formal Logic, is any help to science. Indeed it is rather a hindrance. It deludes the student with the idea that the greatest difficulty has been surmounted. It perverts the relations of science to philosophy, and ministers to the latter's conceit, which imagines that it is bestowing a valuable guarantee upon science, whereas, in fact, it is only the actual discovery of particular laws that gives any value or meaning to the belief in universal law, and supplies it with the confirmation needed to render it more than an idle postulate. So far, therefore, from its being true that belief in the particular depends on belief in the universal, the logical connexion is rather the other way. Nay, the opposite belief does harm, because it fills the philosopher with self-satisfaction at having enunciated the universal law. He thereupon gladly washes his hands of the menial office of discovering the particular laws. Give him the elevating consciousness that all events must happen according to law, and he feels entitled to despise the scientific drudges who are labouring to find out according to *what* law they happen. And this attitude is bad both for philosophy and for science.

(4) Even formally there is a glaring breach between the philosophic faith in the Universal Law of Causation and the actual methods of science. Not only is there no continuity between the two, but for the rationalist there is even an impassable chasm. Rationalism conceives the Universal Law of Causation as an '*a priori* necessity of thought,' but it is willing to concede to the facts of scientific history that the particular laws of causal connexion are derivable only from experience. The incongruity is obvious. How is it that an *a priori* law does not permit of exemplification *a priori*? How is it that empirical laws can become relevant at all to the proof of an *a priori* principle?

(*b*) No doubt this lack of connexion between the universal principle and its exemplifications is not produced if the former is conceived correctly as a postulate. But even on this view of its character the principle only

takes us to the threshold of science, and there leaves us with a general encouragement to go in and win. In Chap. XX the 'Universal Law of Causation,' when completely analysed, turned out to be a complicated set of postulates, all of which required confirmation by experience. This confirmation they can receive only from the actual discovery of 'causal' sequences. Hence they *logically* presuppose the actual discovery of laws, even though *psychologically* the belief that a particular series of events was causally connected was presupposed in the successful analysis. It stands to reason, therefore, that our postulates are not logically independent of their working, and of the actual laws of nature, by which their working is attested. Nor can they attempt to guarantee the working of any particular law. Their service to science merely amounts to giving a general licence to practice, and encouraging the worker in one department by reminding him of the successes of his colleagues in the others.

But is not this quite enough? Was it after all reasonable to imagine that the laws of nature were to be discovered by a mere profession of faith in nature's conformity to law? And however superfluous the question may seem to the prejudices of Formal logicians, we are getting into closer contact with the realities of science by asking—*How are particular laws of nature discovered?* To answer this question we must, however, first examine the conception of Laws of Nature and their relations to the particular 'cases' which are taken to exemplify them.

§ 2. *Laws of Nature*

The belief that there are Laws of Nature, *in the plural*, is the scientific assumption *par excellence*, and their discovery is the unceasing concern of science. A Law of Nature may, however, be considered in two ways, which should be distinguished, but need not be separated. We may inquire (1) *logically* or *subjectively*, what do we mean by postulating 'laws,' how do they help us, what

function do they perform in our knowing of reality? Or (2) we may wonder *ontologically* or *objectively*, what is it in nature that responds to our postulate, why do things behave *as if* their course were controlled by laws? Strictly, the first question alone concerns logic, and the second may be relegated to metaphysics; at any rate we ought to begin by considering the first.

For logical purposes a *Law of Nature* is a compendious formula which is intended to describe the actual behaviour of some selected series of events, and is not *known* to be *merely* a convenient fiction.[1] The function of such a formula is to enable us to analyse, to predict, and ultimately to control, the course of events.

The genesis of such a formula and how we come by it, is various, and does not logically matter. It may appear to have all the irresistible 'givenness' of observed fact, as that 'all crows are black and swans white'; or it may arise as a deduction from a subtle and complicated theory, like the interpretation of the behaviour of 'radio-active' bodies. It may have been puzzled out by patient experiment, or compiled out of arid statistics, or have flashed upon the mind as a happy thought. It may be the fruit of a secular growth of error, illusion, superstition, and fraud, or the reward of conscientious adherence to elaborately tested truths. But all these differences in the origin of the magical formula do not affect its value, nor alter the constant logical features which indissolubly bind the 'law,' (1) to the mind which frames it, and (2) to the 'facts' which it formulates.

§ 3. *'Laws' and their Makers*

Laws of Nature resemble those of a civilized community in two respects at least; they *have first to be made*, and in their making the personality of the law-maker is by no means negligible. Indeed the sagacity

[1] It is necessary to add this last clause in order to differentiate the 'law' from recognized fictions, such as those which are used in applying mathematics to experience, or, in pure mathematics itself, in feigning a curve to be composed of an infinite number of straight lines.

to divine the 'law' which sets in order a chaos of phenomena is an essential equipment of the scientific genius which ordinary logic consistently ignores with the ordinary jealousy of the ordinary for the extraordinary, because it is professionally pledged to reduce the new to the old. But Formal Logic should at least recognize its bias to the extent of seeing that the personality of the inventor does not cease to operate because its own weakness has despaired of formulating it, and its pedantry has ruled it out of order.

Secondly, the interest of the law-maker's inventive mind is always highly selective. He never uses *all* the 'facts' that present themselves to his mind; his genius and efficiency are exhibited in making the selection which forwards his purpose, in picking out the relevant and important, in casting aside the irrelevant, and in taking *successfully* the risks inseparable from a procedure which bias, prejudice, and stupidity also take, *without* the sanction of success.

This process of selection begins with the first analysis of the presented continuum, and persists until the decision between rival theories is finally effected. The masterful selectiveness of the human genius in the higher reaches of speculation it is hardly possible to overlook; such makers of new values as Heraclitus, Plato, Descartes, Galileo, Newton, Darwin, and James have made reality a different thing to live with for all succeeding generations. But that selection takes place also in the earlier stages of our cognitive procedure is less obvious, and has not been noted; for the reason that the analysis of the perceptual data which yields the first 'facts' necessarily proceeds mainly on traditional lines, determined by the operation of sense-organs, which no genius can greatly alter. Nevertheless the organs of sense are themselves selective instruments, and even that 'all crows are black' is not strictly 'fact' until we have made it so. To make it so there had to be picked out of a continuous field of vision certain independently mobile spots of blackness, and identified as 'crows'; then 'crows' had to be distinguished

from other 'birds,' and the blackness observed in the first crow had to be taken as a 'quality' not individual but specific, in order that it might be expected of all other 'crows.' Lastly, the treatment of possible exceptions had to be considered: was the occurrence of white crows to dictate a retractation of our 'law' of corvine coloration, or to be explained away, by 'albinism' or 'accident' or change in the definition of 'crow'?[1] These alternatives are largely matters of policy and necessarily 'arbitrary'; but they may sometimes be so difficult that they cannot be decided without statistical information about the relative frequency of white crows and a consideration of the convenience of ignoring them. But by the time all these points have been settled, is it not clear that we have departed far from the naïve immediacy of the 'simple fact of perception' that a crow is black, and from the conviction that no one (not even a blind man) is at liberty to see it otherwise? Is it so absurd, then, to contend that the 'law' (if it is a law) that 'crows are black' is as decidedly a human invention as Newton's law of gravitation? It cannot be denied that the 'law' is in a sense a made thing, simply because human activity, and analysis, rearrangement and selective interpretation of the given, begin already at the level of what seems merely 'passive' perception of 'fact.' It follows that the logical consideration of the 'law' must not sever it from the 'cases' *of which* it is the 'law.'

§ 4. *The Interdependence of 'Law' and 'Fact'*

It is a fatal mistake to regard the distinction between 'law' and 'fact' either as absolute or as absolutely given. Each is relative to the other. The 'event' we single out is meant to be a 'case' for a 'law.' The 'law' is meant to be applicable to the 'case,' and to form a bridge from one 'case' to another. For only so can the conception of laws of nature enable us to reason from one case to another, and to forecast the course of reality. A 'law' that

[1] As in the case of the whiteness of 'swans,' cf. Chap. XVI, § 9.

was exemplified by no 'facts' would be as worthless and scientifically as intolerable as a 'fact' that was recalcitrant to all 'law.' Every 'fact' is fact always in relation to some 'law.' Either is convertible into the other. A 'law,' nay, even a guess, hypothesis, or theory, may become a 'fact'; conversely, 'facts' may engender 'laws' without a break of scientific continuity.

Nor is either 'fact' or 'law' rigid and immutable. As our knowledge grows, either or both may have to be restated. The history of every science attests this, and exhibits the most astounding transformations both of the 'facts' and of their 'laws.' The astronomical 'fact' behind 'sunset' and 'sunrise' is now the axial rotation of the earth; the 'fact' in 'witchcraft' is hypnotism and hysteria, and in 'malaria' a joint parasite of man and a mosquito; the 'indivisible' atom has grown into a ball-room for hosts of revolving 'electrons.' 'Facts' are sensitive to every breath of scientific doctrine. They have their day like 'theories' and dogs, and a logic which treats them as absolute starting-points is as false to science as one which allows '*a priori*' laws to remain inapplicable and exempt from refutation by fact.

The logical justification for the way in which science actually handles both 'facts' and 'laws' is, of course, that both were from the first, and throughout remain, relative to man and instrumental to human knowledge. It is precisely the ineradicable 'subjectivity' of both that accounts for, and justifies, the 'arbitrary' manipulation to which they are subjected. It is because they are both abstractions of our making, though at different levels, that we can treat them so. We saw in Chap. XX, § 3, that 'facts' had to be extracted by selective attention from the flux of reality; and until there are 'facts,' there is nothing for a 'law' to apply to and connect. But the flow of reality is unique, and never repeats itself. Hence a 'fact' that can recur identifiably, and a 'law' that can be exemplified in a plurality of 'cases' are interdependent artefacts.

Science must abstract, even to get 'facts,' in order to get

'cases' for making 'laws.' It must get away from the unique whole to get 'facts,' it must get away from the infinite 'particularity' of 'facts' to get 'laws.' For neither of these admit of the definite prediction science aims at, because neither of them are capable of recurrence. Logic hitherto has seen that science could not utilize a disconnected plurality of 'facts,' but not that an unanalysed whole was equally obnoxious, and that both at bottom were only different names for the same thing, viz. the impracticable uniqueness of immediate experience. Scientific thought, therefore, (in thought) abolishes both together, and replaces them by something different in kind. It formulates particular uniformities which are separately traceable without regard to their immanence in the flux, and are exemplified in 'cases' which can be treated as cases of 'the same.'

This procedure seems, of course, 'arbitrary' and audacious, but its validity can be disputed only by one who does not shrink from abdicating the use of his intelligence. It cannot, however, be vindicated without cost. It is part of the cost that *the right to abstract* must be conceded to man, and *to make truth by departing from the given.* The notion that 'truth' can be conceived as a slavish reproduction of 'reality' (*i.e.* of the flux) must go, for good and all. It is part of the cost, also, that the risk of all real reasoning must be faced and not concealed, and that the hope of finding 'forms' which eliminate all risk must be abandoned. The theorist of reasoning must forget as little as the practitioner that when we abstract, and select, and reject, we may always *choose wrongly*, and that no 'formal validity' protects against such 'errors of judgment.' And as all Formal Logic has been an attempt to reach such validity, it has adopted a false and impossible ideal, and can never attain to truth.

§ 5. *The 'Law' and the 'Case'*

It has now, however, become possible to understand how we really reason. In logical form our procedure is

always essentially the same and extremely simple. We select a 'fact' *tentatively*, as a 'case' of a 'law,' and try to find a 'law' that fits the 'fact.' Whether the 'law' is old and known already, or new and formulated for this case, does not matter. Nor is it important whether the 'law' was suggested (*to us*) by the 'fact,' or was deduced from other 'laws' and was operative in the extraction of the 'fact.' The interactions of 'fact' and 'law' may be very various and complex. But what is essential is that both our selections should be conceived as experimental, indefinitely improvable, and mutually adjustable. The distinction between 'induction' and 'deduction' is not fundamental, because the reasoning in both is essentially an experiment which is tested by its consequences; nor does it matter whether we use one 'fact' or a multitude in formulating the 'law.'

It is, however, essential that the 'law' should be empirically tested by its working. It has no value until it is verified, or at least not the value it claimed. Now to be *verified*, *i.e.* confirmed, or, more probably, expanded and corrected, it must be applied to fresh 'cases.' It is not really 'true' until it has shown itself useful, and any test which will prove it true may also prove it false, and lead to its rejection.[1] Failure in application means uselessness, and sooner or later entails rejection.

Thus application to 'cases' is indispensable to the truth of the 'law.' For the 'law' is needed in order to reason from 'case' to 'case.' This process of reasoning is logically uniform and not difficult to symbolize. Even in the simplest case of real reasoning the 'facts' which are taken as 'cases' are never quite the same. They always differ in an indefinite number of respects. Hence to reason from them is possible only on the assumption that these differences are irrelevant, and that for our purpose they may be taken as the same. If then we symbolize them

[1] Hence an *a priori* truth is a contradiction *in adjecto*; it is a 'truth' that claims to evade the test of verification. On the other hand, if a 'law' has worked well in the past, or is felt to have emotional value, it is not surrendered to the first discrepancy of 'fact.' Hence 'axioms,' metaphysics, and personal prejudices are very difficult to refute, even when they work badly.

as *a*1 and *a*2, *the postulate of all reasoning is that both a*1 *and a*2 *may be taken as cases of A*, the 'law' or 'universal.' In any actual case *a*1 and *a*2 are always known to be more than A, to be really *a*1 + . . . and *a*2 + . . .; but this overplus of fact and so of possible meaning is ignored and taken to be irrelevant. That it is so, is the hypothesis or experiment which the reasoning makes and which experience has to confirm, and it is the condition of the possibility of reasoning.

But herein lies also its liability to error. If the 'cases of A' are really '*a*1 + . . .' '*a*2 + . . .,' they may contain also B, C, etc., and it may be that for our purpose one or other of them will not act as a 'case of A,' but rather as a 'case of B,' or of something else. It depends, therefore, on the nature of our interest whether its analysis as a 'case of A' was 'true' or 'false.' For example, whether a 'metre' is 3 feet, 39 inches, or 39·37 inches, and the value of π is $\frac{22}{7}$ or 3·1416, depends on the degree of accuracy which any particular calculation demands. A greater accuracy than is needed is a waste of energy and therefore irrational; a less, is failure to attain a purpose, and is therefore wrong. Without a knowledge, therefore, of the actual circumstances of the application or use of a 'law,' it is impossible even to ask whether or not it is 'true.' The notion of a merely formal truth of a 'law' is meaningless. It is clear also that a 'law' may be 'true enough' for one purpose, without being adequate for another.[1]

A 'law,' in short, is not an absolute self-evident and self-dependent certainty to be imposed on reality by main force; it is a flexible formula for application to cases, and gets its real meaning from the cases to which it has been successfully applied.

Thus the Law of Nature is, in several essential respects, like the Common Law of the realm. Like it, it

[1] The notion of *absolute* accuracy in real measurement is impossible and strictly unmeaning. For there are limits to the accuracy of all our instruments and organs of perception. The results of mathematics can be absolutely accurate while they are 'pure,' only because they are ideal; no sooner are they *applied* than they become approximations.

is '*case law*.' That is, it is not the application of a pre-existing rigid *code* to cases that are certain to submit to it, but rests on a perception that circumstances alter cases and the decision of cases the state of the law. The law, indeed, is nothing but the outcome of *right decisions* of past cases. Its value and its validity depend on its success in handling the case. And just as the judge's right decisions of cases *make* the Common Law, so the scientist's successful predictions make true the 'law of nature' used in arriving at them.

Moreover, just as the judge has to take the responsibility and the risk of deciding *which* legal principle is to be *applied* and argues from case to case by setting aside as irrelevant (some of) the individual features of each, so the scientist has the responsibility of deciding how much of the unique course of nature may be treated as irrelevant, and of devising a form which will cover all that is essential in the 'facts.' Both also will find that successful application alters their 'law.' The principle used is extended or restricted, made more precise or comprehensive, has its perspective and centre of gravity shifted, by its use. Thus both yield *decisions* without finality, whereas Formal Logic, after closing its eyes to the existence of alternatives, labours vainly to attain finality without decisions. And both recognize that they are confronted by the difficulty of *choosing the right principle*. In judicial proceedings the existence of this choice is formally recognized. Not only is it the judge's duty to decide the case aright, but the parties interested are officially empowered to suggest the right principles for the case, and the dispute to be decided therefore usually turns upon the question of the *relevant precedents*. Is the case more justly conceived as case a_1 of law A or as case b_1 of law B? In science the technique of listening to both sides of the case before attempting a decision is not so elaborately developed; yet on all real scientific questions there are generally differences of opinion between different schools of inquirers, each of which urges its own view of the case, and thus to some extent performs

the functions, and yields the safeguards, of the legal procedure. It is one of the chief mischiefs of the misconception of scientific law which we owe to Formal Logic that it has systematically slurred over the normal existence of alternatives in scientific inquiry; for this has kept us unaware both of the manner and of the motive of decisions between rival interpretations, and of the immense harm which is done both to science and to society by encouraging a dogmatic and intolerant habit of mind.

§ 6. *The Mutability of Laws*

The function of Laws of Nature as instruments for the progressive analysis of experience requires them to be, as we have insisted (§§ 3, 4), provisional formulas. Man must have complete freedom to change them as the state of his 'facts' may from time to time require, History, moreover, shows that he has continually exercised this right and changed his formulas. But, overawed by Formal Logic, he has done so apologetically and with a bad conscience. He has tried to conceal the nature of his procedure even from himself. He has kept old terms in use with new meanings, and by means of their verbal identity has denied or minimized the change. He has anxiously explained that the Laws of Nature themselves have not changed, but only his knowledge of them. He has pleaded that only the formulation of the law has been amended. He has admitted that he has been mistaken now and again, but not that his past 'mistakes' were humanly the proper way to his present 'truths.' He has ever since he began been correcting the truths he had, and after every improvement has deluded himself with the conviction that now at last he had attained final and absolute truth. When the 'sceptics,' who alone have shown some glimmering of the real nature of his proceedings, have animadverted upon the transitoriness of human 'truth,' he has proudly pointed out how well some of his laws have lasted, and

instanced the truths of common arithmetic as forming a common measure of the savage and the scientific mind.

But all these things are subterfuges, and impediments to scientific progress. In point of fact the 'Laws of Nature,' *as known to us*, are in a constant flux, which is relatively slow only by comparison with the torrential flow of immediate experience. To keep them unchanged, we should have to arrest the growth of knowledge, and so the more rapidly they change, the more signally do they attest the progress of science. Even where identities are to be traced between the modern formulas and the ancient, they are only verbal. It is *not* true that the laws even of arithmetic are immutable, and that '$2 + 2 = 4$' means the same thing to the savage (once he has learnt to count) and to the mathematician. For in the latter's mind it is coloured by, and continuous with, an immensely larger system of truths, which admits of operations (like 'fractions' which 'divide the unit') that would have seemed impious and impossible to primitive arithmeticians. Nor again are all errors tragic, or things for science to be ashamed of; if she has not been too conceited to learn from them, they may have made stepping-stones for her advance and put into her hands the clues to discovery; the more plentifully they are detected, the better evidence do they yield of the scientific activity which has transcended them. A mind, in short, which has come to rest in a truth it fancies 'absolute,' is *not* the ideal of science; the ideal of science is not a fool's paradise, but a perpetual progress by unremitting work.

The belief in the immutability of Natural Law has only two points in its favour, one of which is an advantage of method, and the other an emotional prejudice. It is, in the first place, a *convenience* not to have to change too often the formulas we use in our calculations. Sciences use text-books, and it is a nuisance to have to be constantly rewriting them.

Secondly, it is exceedingly comforting to many minds to feel themselves subject to a stable, fixed, unchanging order, which seems to promise them the fulfilment of

their purposes. But into this belief there enters a considerable element of illusion. For (1) this fixed order of nature is quite compatible with what to us are the most appalling catastrophes, and convulsions of nature like the Messina earthquake do not become less deadly because we have ceased to ascribe them to the wrath of gods or the malignity of devils and now regard them as strictly 'natural,' and due to quite trivial 'faults' in the geological structure of the terrestrial crust. (2) A nature capable of changing, or of being altered, for the better, seems humanly preferable to one that is unchanging. (3) The belief in an unchanging order is connected with that in the immutability of scientific formulas only by a confusion. The objective order is thought to guarantee the immutability of the subjective order. But this is an entire mistake. The stability of reality could only render our knowledge stable, if and when we had discovered the whole truth. This could only be, therefore, when progress of knowledge had become impossible, because everything was known. So long as knowledge can grow, there is no reason for refusing to alter our scientific laws, because of the assumed immutability of reality. Nay, there is good reason for consciously viewing our scientific conceptions as mutable. For this will make us more willing to improve them, and more ready to look out for better formulations. A constant readiness to test the accepted 'laws,' and to modify them until they work as well as possible, is a much better guarantee of maximizing truth than the most firmly fanatical faith in the immutability of 'Nature.'

§ 7. *The 'Eternity' of Laws*

The belief in the 'eternity' of Laws of Nature is closely connected with that in their immutability, and exemplifies a similar confusion between the ideal and the actual, the abstract and the concrete. This confusion is of course supported by scandalous laxity in the use of the term 'eternal.' It would seem that no less than *five*

senses are involved. (1) 'Eternal' is often used as an equivalent of 'everlasting,' *i.e.* enduring throughout all time. (2) 'Eternal' may mean 'changeless,' or (3) 'timeless,' *i.e.* that which cannot be an 'event,' or be related to events, as, *e.g.*, geometrical truths, which form part of an ideal system which has abstracted from time-relations once and for all. But (4) 'eternal' is also used as meaning 'applicable at any time and to any event.' And lastly, (5) 'eternal' may refer to the fixed *dating* of temporal events.

Now it is clear that 'Nature' may or may not be 'eternal' in the first sense without necessarily being 'eternal' in the sense of 'changeless,' and that the same will be true of its 'laws.' Neither 'Nature' nor its 'laws,' however, can be wholly unrelated to events in time, as these are facts in nature and the 'laws' are supposed to regulate them. Hence the 'laws' are not strictly 'timeless' (sense 3), but rather 'applicable at any time' (sense 4). And lastly, every event determined by a Law of Nature may be conceived to have, and for ever to retain, a fixed date (sense 5).

If, however, Nature, or at least its 'laws' are conceived as changeless (sense 2), what is assumed of the perfect order may be falsely transferred to the order of nature as we know it, and it may then be inferred that the formulas by which we represent the order of nature cannot be changed, because the Laws of Nature ought to be 'eternal.'

As regards 'timelessness,' the third and fourth senses are commonly confused, because the 'law' is contemplated only in the abstract and not in its use. In the abstract a Law of Nature seems to abstract from time altogether. It does not specify any particular time, nor mention the time-context of the events from which it was extracted. It is tempting to construe this as an essential timelessness and independence of the time-series, especially for philosophers, who are not proposing to use the law for the purpose of predicting events, and are content merely to 'contemplate' it. They consequently

fail to observe that the time-context was abstracted from in framing the law, because it was judged to be irrelevant. Or rather, it had to be abstracted from, in order that it might perform its function of serving as an instrument of calculation and prediction. It is precisely by ignoring its temporal connexions that a 'causal' sequence A – B is liberated from its immanence in the flux of the moment, and becomes transferable to other portions of it, and able to analyse them. As this is the function we require of our 'law,' it is clear that its 'timelessness' is provisional, and an artifice. The 'law' is meant as a device for predicting the behaviour of 'cases'; and every 'case' to which the 'law' applies is immersed in the time-series. The timelessness of the law, then, does not mean absence of relation to the time-series (as in the third sense), but *applicability to, and at, any time.* It is a device to ensure usefulness, but leaves the actual use of the laws and its exemplification in the case as temporal as ever. Formal Logic has mistaken its nature, because, as usual, it has neglected to consider the use of its fictions.

Is it not in any case somewhat childish to imagine that we can, by devising formulas which express no reference to time, prevent reality from changing, or ensure that it shall change only in the ways to which we are accustomed? The fact that this belief appears to be seriously entertained curiously attests the continuity of metaphysical philosophy with the sympathetic magic of primitive man. In point of fact, of course, the question whether the 'Laws of Nature' are objectively changeable or stable can only be investigated (and *perhaps* decided) empirically, and cannot be affected by any intention of ours to preserve our formulas unchanged. Should reality change, our refusal to change them will only have the effect of rendering them inapplicable to reality and of compelling us to devise fresh formulas that *will* apply to the altered state of things. Why this should seem preferable to the admission that a Law of Nature may change, it is difficult to say.

'But,' it is objected, 'does it not remain an "eternal"

truth that the old laws applied when they did apply? And does not that prove their eternity?' (sense 5). No, it proves only that they, like all events, can be given a determinate place in the time-order. But 'eternity' in this sense means '*once and never again*,' and is the exact opposite of the first. The result, then, is that until the logical doctrine of the 'eternity' of truth ceases to confound together (1) endurance through time, (2) transcendence of time, (3) unrelatedness to time, (4) abstraction from a particular time, and (5) determinate position in time, it will be best for science to trouble about it as little as possible in its manipulation of the Laws of Nature.

§ 8. *Transition to the 'Objective' Law*

No superstitious reverence, therefore, for the creations of our minds need impede us in handling the Laws of Nature as freely as the purposes of science may require. We need not blind ourselves to the fact that so far the 'properties' of these 'laws' consist essentially of fictions and postulates. Nay more, there is in them also a strong infusion of pure verbalism. Thus we are commonly told that Laws of Nature differ from those of man in that they cannot be 'broken.' But they cannot be broken, not because 'nature' (or 'God') is so much more powerful than any human authority and can make its laws respected, but simply because an exception, once we admit it, destroys our 'law.' The 'law' has been defined as covering *all* its 'cases'; hence, if an apparent exception crops up, something has to be done. Either we must show that it is no real exception, or deny that it is a case of the law, or we must alter the law until the case ceases to defy a formula which is universal by definition. In the last case we simply say that the law which is now abrogated never was the 'true' law. As, moreover, it rests with us not only to formulate the law, but also to say what are to be 'cases' of it and 'exceptions' to it, it is evident that we can do very much what we please in

such cases. The impossibility of 'breaking' a Law of Nature proves nothing but our determination to uphold a phraseology we have found convenient. It is by our convenience also that we determine *which* alternative to prefer, when a law is confronted with an apparent exception.

Nevertheless there are limits to the efficacy of convenience in our attitude towards 'nature.' Or rather, it is an essential element in our 'convenience' that our devices should sooner or later conform with what is commonly called 'the objective nature of reality,' and that our manipulations should hold at least to the extent of predicting the course of events. This need for empirical confirmation sufficiently controls and redeems the initial arbitrariness of our procedure.

Not that it has appreciably troubled the scientist. He can in general take a conformity between the procedure of science and the course of reality for granted. He can assume that any formulas that concern him must more or less apply to reality, and that his business is not to inquire why they apply, but only to test them and to find out which of them applies best and is most convenient, and then to select the one which works best and to call it 'true' until he can improve on it.

But the logician must go deeper into the problem of what is meant by the objective nature of things, and the dependence of truth on 'agreement' or 'correspondence' with it. He may perhaps leave aside as metaphysics the question what makes reality as subservient as it seems to be to many of our manipulations; but he must at least point out that their success shows that Laws of Nature cannot be merely the arbitrary creatures of the scientific imagination they seem at first. At the very least it must be noted that reality is such that our guesses come true, and that its behaviour can be divined. We come, therefore, upon the question, postponed in § 2, as to why our assumption of 'laws' works, and why things behave as if they were subject to laws.

§ 9. *Why do 'Laws' work?*

That our assumption of 'Laws of Nature' should enable us to analyse the course of experience is sufficiently surprising. Nothing at first seems more wildly unlikely than that nature should allow itself to be predicted and controlled by so arbitrary a device. It is surely strange that we should be entitled to extract from anything we are pleased to regard as an 'event,' a general formula which has eliminated all reference to the place, time, and circumstances of the event, but can nevertheless be transferred to an indefinite number of similarly selected other events, and assure us in advance of their future course, despite of the unique peculiarity of their time, place, and circumstances.

It is pardonable that this remarkable fact of experience should often have upset the balance of the human mind, and have led men to idolize their 'laws,' as they idolized other similar achievements of their intelligence, such as their 'numbers,' their 'figures,' and their 'calendar.' It seemed natural to attribute to these laws a higher and holier kind of being than that of the fleeting 'particulars' from which they were elicited. For man worships what is *very* useful, especially if he does not quite understand its use.[1] No wonder, therefore, metaphysics sought for a more mystical relationship between man and nature than any which science could fathom or even utilize, and spoke oracularly of 'Universals,' which 'somehow' were to be both the inmost core of reality and direct revelations of its ideal meaning to the mind of man.

But this Platonizing attitude is tenable only at a safe philosophic distance from the realities of science, and while the process of framing, modifying, and amending scientific laws is not studied in detail. The scientist in

[1] On the other hand, the worship sometimes persists after the use has ceased. Star-worship, for example, though it was generated by the urgent agricultural need of discovering the length of the year, endured long after the calendar had been settled, and by a strange irony astronomical knowledge became for the Greek philosophers the pattern of the 'higher' knowledge, which was to be humanly useless and all the more admirable for it.

these days has become unromantic enough. It does not seem to him at all marvellous that the human intelligence should have grown modes of thought which are (roughly and in general) adapted to the needs of human life. He simply points out that if man had not succeeded in devising forms of thought which were applicable to reality, he would either have perished, or have adjusted himself to reality in other ways than by the use of his intelligence. Had he not, moreover, tried all sorts of other devices, before he grew content to rely for his control of experience on his skill in formulating 'laws'? What were the various modes of prayer, divination, and magic but alternatives and forerunners of the method which gave birth to science, because it was found to work the best?

True, prayer and magic also presupposed for their efficacy a certain regularity in the agencies appealed to. An incantation, or a talisman, or a prophecy, had to work sufficiently at least to keep up the belief. But this regularity did not attain to the austere impersonality of the abstract Law of Nature, and was hardly greater than was implied in the stability of the agent's own familiar character. A god or a talisman could be trusted like a friend, if you treated them rightly. Thus the belief in their efficacy involved only the general correctness of the dissection of the flux into a plurality of interacting 'things,' which exhibit more or less complete and remote analogies with human nature.

Nor does science to this day repudiate these analogies. The plurality of things is still recognized. The 'Law of Nature' is still conceived as a law of the behaviour of things. And so far as laws are conceived as 'objective,' the analogy of their behaviour with our own still yields the easiest explanation of the law's nature. If things are sufficiently like men, they will tend to form *habits*, and to go on behaving in a *routine* way to which they are accustomed. These habits will then appear to us as *de facto* regularities in their behaviour. In other words, objectively regarded *the 'Laws of Nature' are simply the*

Habits of Nature, and it is the rule of Habit that makes the whole world kin. The more deep-seated the habit, the more 'mechanical' the regularity it shows, the easier it is to find a formula for it, to call it a 'quality' of the thing, and to predict how it will behave. It is thus because things have habits that we can understand them, predict them, and exploit them. Hurrah, then, for the force of Habit, and the intelligence which detects it!

But can habits be absolutely trusted? Is there not another side to them which is less convenient for our purposes? We find that though we are all the creatures of habits, yet we are not wholly their slaves. We can all to some extent (at all events while we are young and teachable) modify our old habits, start new ones, and, in so far as we can do this, our behaviour cannot be predicted. The question, therefore, whether the order of nature is fixed, or 'Laws of Nature' can change, assumes a new aspect. To answer it we should ask—Are the habits of all things unchangeable, and if not, which can be changed, and why, and how?

§ 10. *Can the Habits of Things change?*

If we leave aside as irrelevant to our problem the case of a possible being who is perfectly adapted to all emergencies, and would, of course, have no motive to change, and consider only beings whose adaptation to their conditions of existence is imperfect, we find (1) that though both Habit and Intelligence must be instruments of adaptation there is a certain antagonism between them, and (2) that the capacity to change depends on the amount of their intelligence. The unchecked control of action by Habit would mean general adaptation to regular conditions, but would entail failure to effect adjustment to exceptional circumstances. The guidance of action by Habit, therefore, would be adequate only if all the emergencies of life could be treated as 'cases' of a comparatively small number of rules; it must fail wherever the special circumstances of the case demand a

modification in the habitual response. Moreover, just because every case has individual features, the adjustment to it by means of the rule or habit can never be exact. There is room, therefore, for a faculty of effecting a more exact adaptation to the case, which takes account of its peculiarities, and of modifying habitual action accordingly. For example, it is vain that a trout should have formed the habit of rising to flies, and in thousands of cases found in them its natural nutriment, if he fails to distinguish from them the artificial fly which puts an end to his career. The name for this power of modifying habitual responses, inhibiting natural impulses, and taking account of particular circumstances is *Intelligence*, or in its highest developments *Reason*, and this is why its possession is such a valuable equipment in the struggle for existence. All 'intelligent' beings possess, more or less, the power to modify their habits, and the existence of this power is the surest indication of intelligence. It is because they show traces of it that we ascribe a certain intelligence to plants and the lower animals ; it is because their behaviour does not so obviously suggest it that we usually deny intelligence to crystals and other forms of 'inanimate matter.' Moreover, the higher the intelligence, the greater the variability of action, because the greater is the revolt against mere habit, and the more account is taken of the special circumstances of each case. An ideally intelligent being, therefore, would be able to adjust his action in a unique way to every unique situation, and would never act from unintelligent *routine*. But for this very reason his act could never be absolutely predicted by mere observation of his 'habits'; it could be anticipated only by a similarly intelligent understanding of his aims. This is why intelligence and personality are usually regarded as such stumbling-blocks to the rough methods of 'mechanical' science.

On the other hand, the lower the intelligence, the further it would sink into *routine* habits, the more nearly would it approach the ideal of 'mechanical' regularity, and complete predictability, and the more conveniently

could it be calculated in a purely external way. The realm, therefore, to which the Laws of Nature really apply is that of the inanimate and unintelligent, and there is a definite contrast between its behaviour and that of intelligent nature. For though man, despite his stupidity, pedantry, and cowardice, far surpasses all other beings in his will and power to modify his habits, animals and plants also, more slowly, change their habits when the conditions of their life are changed; but the properties of 'matter' seem to endure immutably.

And yet are we really certain even of this? Have we really unquestionable evidence that the habits of the inanimate do not change? Man has observed the ways of nature for a few hundred years at most, and, until the last ten years or so, with a universal and enormous bias in favour of immutability. In this brief period moderately slow changes would not be observed, and had they been observed would not have been accepted. It is no wonder, therefore, that no decisive evidence of change was found; but this does not warrant our dismissing as unfounded the suggestion that even the most automatic and mechanical beings in the world may be slowly modifying even their most fundamental habits in the course of ages, or in other words, that even the 'Laws of Nature' may be 'evolving.'

Of course it is not to be expected that this possibility will be proved speedily or easily; but it has definitely begun to loom large on the scientific horizon. In the sciences that are concerned with living beings the triumph of Evolutionism may be regarded as complete. The victory of Darwinism has routed the belief that the sun shines upon nothing new in the organic world. But Evolutionism is now invading also chemistry and physics. The *Periodic Law* looks suspiciously like a first formulation of the law of the Evolution of the 'Elements.' And the facts of '*Radio-activity*' are still more suggestive. Their best interpretation seems to be that a good few of the metals, and notably 'uranium,' have ceased to be stable, and are breaking up. The 'eternity' of the

'elements,' therefore, was a superstition, a creation of our prejudice. But shall our prejudices never recoil more than one step at a time? Shall we infer only that 'uranium' has always had this habit? If so, it would seem to follow that the world's stock of uranium is a constantly diminishing quantity, and cannot last more than a definite (and perhaps calculable) time. It cannot, therefore, have existed unchanged from all eternity, but must have come into being in some definite amount at some definite point in the past. This brings science uncomfortably near to the thought of a beginning (and therefore of an end)[1] of the cosmic scheme, and to a denial of its 'eternity.' It might, therefore, involve a less shock to prejudice to accept the alternative that 'radio-activity' may itself be an *acquired* habit, which radio-active bodies did *not* possess from all eternity, and thus to admit the possibility that all things may acquire new habits of behaviour. This interpretation would seem to be supported by calculations showing that if the radio-active bodies are distributed throughout the earth in the same proportions as in the crust we can examine, and if their 'dissociation' has been proceeding ever since the earth's formation, they would have radiated so much heat that the earth's temperature should be much higher than in fact it is. But without attaching too much weight to investigations which avowedly are incomplete, we may clearly insist on the logical point that the immutability of the Laws of Nature has not been proved, but only postulated, and that if the 'Laws' are habits, there is a presumption that it is not absolute.

Practically this result need make no difference to scientific calculations. No doubt the possibility of progressive change will introduce a certain complexity and inconvenience into our view of nature, and render the remote future harder to calculate; but for most purposes it will be negligible. Science is already quite accustomed to cope with similar situations. It does not, *e.g.*, hesitate

[1] If all the more solid and active 'elements' are gradually 'dissociating' into helium and other 'inert' gases, the universe will in the end simply evaporate.

to treat the 'day' as a definite duration which is worth determining with the most laborious accuracy, although it knows that the friction of the tides must be gradually slowing down the earth's revolution on its axis, and that ultimately, therefore (if the solar system does not come to a bad end first), the 'day' must grow as long as the 'year.' Nor has an event which is 50,000,000 or 100,000,000 years off any appreciable effect on the feelings of any living man. Revolutionary but remote changes, then, which are brought about by 'Laws' believed to be unchanging, make no difference; why should they upset us if they are ascribed to 'laws' believed to be 'evolving'? Practically the 'laws' have to be somehow changed if the order of events changes; practically they may be taken as constant, if it does not. We have no need or right, then, to conceive the stability of the Laws of Nature as other than a convenient assumption; we must reserve the right to modify it whenever and wherever our science demands it.

§ 11. *'Inductive' and 'Deductive' Reasoning*

If the function of the instruments of thought called Laws of Nature has been sufficiently cleared up by the foregoing account, it will be intelligible both how they are related to 'facts' and how we reason from 'facts.' It will not, however, be out of place to add a few remarks on the relation between 'Induction' and 'Deduction.' As we have already noted (§ 4), our account cannot recognize any essential difference between them. Our procedure in reasoning is always the same. It is always *experimental*, whether we assume a 'law' (or rule) and 'deduce' (apply it to) a 'case,' or assume a 'case' by a selection from the 'given' and infer from it a 'law.' It is always *risky*, because the abstraction or extraction involved may always prove wrong. It is always *empirical*, because our result has always to be verified by its working in experience. The difference will only be that what (successful) experience attests in the case of 'Deduction' is that the antici-

pated result is realized, in that of 'Induction' that the cases really conform to the formula assumed for them. In 'Deduction' we start from the formula and argue to the 'case,' in 'Induction' we start from the 'cases' and argue to the formula; but as both the 'cases' and the 'law' are being tested, and as neither are taken to be certain, there is in both a doubt which further experience alone can progressively remove, and in both the logical value of our procedure depends on its success. Thus, verification is as essential to the conclusions of a deduction as to the most hazardous 'induction' of a hypothetical Law of Nature. The distinction between Deduction and Induction, therefore, is merely Formal, and has no significance in real reasoning. The interaction of 'case' and 'law,' and the reference of both to experience, are the vital points in real reasoning wherever it occurs.

CHAPTER XXII

ACCESSORIES OF INDUCTION

§ 1. *The Artificiality of Formal Distinctions*

THE remaining topics in the Formal theory of Induction must be dealt with briefly, not because they are unimportant in themselves, and could all be neglected if we were attempting a complete study of real knowing, but because Formal Induction has so profoundly misapprehended them that its account is not worth correcting, the more so that the real nature of reasoning has been explained in the last chapter. It is only when the Formal view has completely obscured this that, *e.g.*, Observation, Experiment, Hypothesis, and Analogy can be treated as distinct 'forms' of inductive reasoning.

§ 2. *Observation and Experiment*

'Inductive' logicians usually think it their duty to distinguish between Observation and Experiment, because they proceed from a false theory of knowledge. They accept the belief in the passivity of mind, and then regard 'observation' as a passive reception of 'impressions,' while 'experiment' is a symptom of mental 'activity.' On their own showing the distinction hardly seems worth making; for they have to call 'experiment' *active* 'observation,' and it is obviously awkward to use the same name for species and genus.

What is more serious is that the whole antithesis between 'activity' and 'passivity' is unsound, and that

psychology and biology do not warrant our describing any mental process as more than relatively 'passive.' Biologically the functioning of every sense-organ, and indeed every part of an organism's behaviour, must be conceived as a *reaction* upon stimulation, and therefore as 'active.' Psychologically all functioning is *selective*, and marked by extraordinary amounts of blindness and sensitiveness in different directions. These can only be understood as due to the organism's past or present preferences for one mode of living as against others, and so are intimately correlated with its 'will to live' in one way rather than in another. The 'passivity' of sensations is inadmissible, because 'sensations' are mere figments of theory, and what is actually experienced are 'perceptions,' which imply activity and interpret stimulations in the light of previous experience. Moreover 'observation,' to be of scientific use, requires both attention and purpose, *i.e.* a knowledge of the points to be observed. Logically, we have seen (Chaps. XVIII, § 2, XIX, § 7, XX, § 3), every judgment is an experiment, and involves a risk of error.

It follows on all these grounds that the 'passivity' of any mental process can never be absolute. 'Passivity' means a slackening of the volitional directing of experience, a lapse into automatism and *routine*, a mechanical and thoughtless way of accepting experiences as they come. Up to a point it is of course possible to get into such conditions, but they are not valuable for scientific purposes nor exclusively associated with the functioning of sense-perception. There is quite as much and quite as harmful 'passivity' about the unthinking acquiescence in verbal and meaningless formulas in philosophy and science as about the laziest self-abandonment to the 'impressions' of the senses.

Secondly, *good* observation is anything but passive. It involves active watchfulness. It demands enormous concentration of the attention on the point of the inquiry, enormous indifference to, and ruthless abstraction from, everything else. It is therefore subject to the same risk

as experiment, and as apt to go wrong, if misdirected. Indeed it is only another sort, or perhaps another stage, of experiment. In both we begin by changing the conditions experimentally before observing, even if in 'observation' the change is merely that of taking up an attitude of watchfulness towards certain objects. And conversely, experiment would be useless if it were not accompanied by observation.

On the whole, therefore, a theory of knowledge which recognizes the all-pervasiveness of mental activity and realizes how very strenuous a thing scientific knowing is, will hardly think it worth while to maintain the distinction, by inflating the differences, between Observation and Experiment, nor waste its time over drawing a line in theory which is mostly invisible in practice.

§ 3. *Hypothesis*

The recognition of mental activity enormously simplifies the problem of *Hypothesis*. It is unnecessary to discuss either the question of principle, whether hypotheses are permissible, or questions of detail as to what hypotheses are 'valid' and how a 'good' one may be distinguished from a 'bad' one. If every 'fact' rests on selection and involves an experimental analysis of the given,[1] and if every 'law' is provisional and in need of confirmation, it follows that there is something hypothetical about every act of thought, and that the distinctions between fact, interpretation, theory, hypothesis, and guess are plastic and fluid, and that the same condition of a scientific inquiry may be differently judged by different observers. And if the truth-claim of every judgment needs to be verified, it is superfluous to insist that unverifiable hypotheses are of no use to science, and so 'invalid.' Nor need the logician attempt to figure in advance the features of the good hypothesis; he would only be adventuring on problems of which he is no judge. So long as he is inexorable in the demand

[1] A *découpage*, as Prof. Bergson calls it.

that scientific hypotheses, like all truth-claims, must work, and that *relevantly* to the problem they concern, the less he ties the hands of scientific insight by pedantic rules, which are not, and cannot be, observed in practice, the better.

It is more to the purpose perhaps to draw attention to the difference between *Hypothesis* and *Fiction*,[1] and the curious relations which obtain between them in practice. Theoretically they seem to be quite distinct. A hypothesis (in the narrower sense) is imagined to represent reality, while a fiction is a creation of unrestricted imagination. But in fact each transforms itself into the other on the slightest provocation. The hypotheses which we had trusted to give us an insight into reality are continually turning out to be fictions, while as a compensation our conscious fictions sometimes seem to come much nearer the truth than their authors ever imagined. Nothing could illustrate this better than the logical history of the 'Atom.' The Atom began its career as a sheer dogma, as an attempt of metaphysics to satisfy one of its grossest prejudices, and to obtain 'simple' elements from which to derive everything complex. But in the course of time it developed so much scientific usefulness in the study of the definite proportions of chemical combination, that 'atoms' were extensively believed to be real entities in nature. Nevertheless the logical defects in the conception remained so glaring that the more critical scientists preferred to interpret it as a useful fiction which facilitated thinking. And then, just as it seemed about to be removed from science as mere 'scaffolding,' the discovery of radio-activity, and its interpretation as due to atomic dissociation, restored the atom to the realm of fact, and for the first time adduced positive evidence of the existence of individual atoms. For the flashes of light to be counted on a sensitive screen exposed to bombardment by radio-active bodies are plausibly interpreted as

[1] For this see Prof. Vaihinger's exhaustive and very able treatment in his *Philosophie des Als Ob*.

due to the impacts of atoms, which are therefore again believed 'really to exist,' although they are no longer imagined to be indivisible and ultimate.

We cannot admit, then, that because we have sincerely believed our conceptions to be true images of reality they become more than fictions, nor that because we have framed them as fictions for our convenience they cannot become as fully true as any knowledge can be. Science, in fact, not infrequently finds herself in the curious position of 'the old priest of Peru,' who '*dreamt* he had converted a Jew,' and is astounded to find that when she awakes to the nature of her procedure, her 'dreams' (guesses, hypotheses, fictions) have a knack of being 'perfectly true.' The moral to be drawn from this is not that Science has, in order to succeed at all costs, sold herself to the powers of darkness and must abjure these formally illegitimate devices, but rather that it is vain to prohibit the play of mental activity with the given, and unwise to restrict its freedom. The products of our activity do not acknowledge the jurisdiction of Formal Logic, and escape from its hard-and-fast classifications; they are judged only by their success, by their actual efficacy in reshaping into more satisfactory forms the problems which the given suggests to the inquirer. Whatever, therefore, the psychological genesis of any hypothesis, its logical value lies in its verification by its working. This is the only applicable condition, and it suffices.

§ 4. *Analogy*

Arguing by *Analogy* originally meant arguing from an *equality or identity of ratios*, but it is now commonly taken more laxly as arguing from any sort of likeness, and as differing from 'induction,' in that it compares two things in many points instead of comparing many things in one point. In spite of this affinity, inductive logicians do not think much of it. It is not, alas, 'formally valid,' and they ought not to labour to formulate the conditions under which analogies can be held to be 'true' and 'false.'

They should have realized rather that the trouble is not only with arguments from analogy. If analogical argument is not 'formally valid,' no argument can be 'formally valid.' For every argument, whether 'inductive' or 'deductive,'[1] is really analogical. In 'induction' we argue from a number of 'cases' to a 'law' or rule. In 'deduction' we apply a rule or law to a number of cases, or, more precisely, extend the rule's application to fresh cases. In both, therefore, several 'cases' of a law are involved. But no two cases are ever absolutely 'identical'; they are known to be only 'similar,' and their 'identity' is always constituted by abstracting from their differences, which are judged to be irrelevant. Hence every argument from 'case' to 'case' must rest upon an analogy, and be 'bad' or 'good' according as the differences abstracted from turn out to be relevant or not. The analogy may, however, be taken in the strict sense of an 'identity of ratios.' It means that if, and in so far as, *a 1* and *a 2* are both 'cases,' they stand in the same relation to *A*, viz. as 'cases of A.' Whether they are *good* 'cases,' whether the analogy is true or false, whether they can successfully be identified as 'cases of A,' is merely the risk which, as we saw (Chap. XXI, § 5), all reasoning takes.

Once more, then, we come upon the experimental risk which it is essential to reasoning to take, and to Formal Logic to try (vainly) to eliminate. It appears in another and very simple way that on the showing of the Formal logicians themselves no reasoning can be 'formally valid.' The only way in which Formal Logic can repudiate this conclusion is by asserting that the 'identity' between the cases is absolute, and denying that there are differences which are neglected, in the cases taken as identical (cf. Chap. X, § 5); but, if so, what sense is there in calling them 'cases' in the plural? Surely to conceive the identity as absolute would exclude even that amount of difference which makes the 'cases' *two*?

[1] Cf. Chap. XVI, § 12

§ 5. *Explanation*

The belief in *Explanation* as a way of augmenting the formal validity of Laws of Nature is part and parcel of the Formalism which has everywhere shown so little appreciation of the real problem of knowing. It rests on the persuasion that deduction can, merely as a form, assure the absolute certainty of a conclusion, and that therefore any Law of Nature is fortified and secured against revision and correction by a 'deduction' from laws of greater generality, which forms its '*explanation*.' Now this is merely one form of the belief that the syllogistic form is proof, and ultimately and strictly the only certain proof, which was so signally exemplified in the Aristotelian notion of demonstration. But it has no reply to the doubt whether the form in which an inference is put can affect its real value.

The belief in Explanation has, however, another root in the conception of *System*, which penetrates still deeper into the past. If a number of propositions, each of which we have grounds for considering true individually, can be brought into connexion with one another, and shown to imply each other, it is manifest that no *one* of them can be rejected without discarding also the rest. They thus support one another as a system, and stand and fall together. Whoever, therefore, attacks any one of them must be prepared to attack also the rest, or else to break down the connexions between them and to show that others are equally thinkable. This is as a rule not difficult, but nevertheless it is true that systematic connexion is a potent way of fortifying a truth, for the simple psychological reasons that it enormously increases the task of the attack and the unwillingness of the defence to surrender to the new truth. It is also true that the sciences as they develop grow more and more systematic.

But on these facts inferences have been based, which not only do not formally follow, but even directly contravene the formalities of proof. It has often been inferred

that the ideal of knowledge would be to form an all-embracing system, and the ideal of Explanation to deduce all knowledge from a single self-evident principle. Now, in the first place, these two propositions do not imply each other. The all-embracing system need not depend on a single principle, but may consist in an indefinite multitude of truths, which (more or less) support one another. This is, in fact, the character of scientific systems.

Secondly, the notion of a single principle, by deduction from which all knowledge is to be unified, is a curious survival of pre-Aristotelian logic. It goes back to one of the loftiest flights of Plato's poetic imagination, in which he conceived the grandiose fancy of a supreme 'Idea of the Good' from which all the other 'Ideas' were to be deduced, thereby rendering all knowledge accessible at one stroke.[1] In other words, all the Laws of Nature were to be 'explained' by being derived from a *single* law which was to be the Universal Key to the whole intelligible world. Plato indeed stops short of complete monism. He never says that the *whole* world is to be unified thus. For the *whole* world is not intelligible, since the phenomenal world is tainted with unreality. But he clearly means that a plurality of Ideas are to be shown to 'depend,' *i.e.* to be *deducible* from one.

Now, ever since the discovery of the Syllogism it ought to have been manifest that this notion is formally impossible. To deduce a conclusion *two* premisses are required, while to deduce any considerable number of conclusions a large supply of primary truths is needed.[2]

[1] *Republic*, bk. vi. It is probable that later in life Plato realized some of the difficulties of working out this notion; at any rate it does not reappear in his later dialogues.

[2] Thus it can be shown arithmetically that with 5 primary principles only 10 conclusions can be proved, whereas with 50 it would be possible to prove 1225. Hence the importance of assuming premisses hypothetically, instead of being forbidden to deduce until an adequate supply of absolutely certain premisses has been acquired (Chap. XVIII, § 2). It is clear, moreover, that the Formal theory of deduction puts itself out of court as a theory of science by its arithmetical inability to allege that it has a stock of intuitively certain premisses anything like adequate to the needs of the sciences with their multitudinous conclusions.

Nothing, therefore, can be deduced from the Idea of Good, or from any other principle *alone*, nor can Deduction result in unification. The mistake was pardonable in Plato, who was a poet and lived before Aristotle had discovered the Syllogism; it is inexcusable in philosophers who had neither excuse, and professed to have studied, and grasped, Formal Logic. They had, moreover, Aristotle's own example to guide them. Aristotle clearly saw that sciences always proceed from a plurality of principles, though he did not think it necessary (or possible?) to enumerate them fully. No doubt he was mistaken in not taking the analysis of scientific principles beyond the point at which they seem 'self-evident'; but at all events his recognition of a plurality of sciences, each equipped with its own peculiar principles, and his refusal to unify all knowledge, are significant departures from the Platonic ideal, which indicate both that he had fully grasped the formal nature of 'Deduction,' and also to a considerable extent the actual structure of the sciences. Plato's ideal, on the other hand, was scientifically as impracticable as it was formally unthinkable. Strictly interpreted, it demanded that science was to proceed from *certain* principles, and asserted that all certainty was derivative from the Idea of Good. Until, therefore, this Idea was ascertained, scientific knowing was prohibited, or at most confined to such philosophic meditation upon the 'hypotheses' of science as might reveal their universal ground.[1]

The logical value of Explanation, then, rests on the psychological difficulty and inconvenience of discarding large bodies of connected truth. But this vindication is plainly psychological, and 'psychology' is taboo to Formal Logic, which should consistently maintain that

[1] Of course the commentators usually conceal this anti-scientific inference from Plato's conception of the relations of science and philosophy. But Plato seems to have put forward the astounding pretension of arresting the development both of science and of practice in all seriousness. Until the absolute rule of philosophy could be instituted over both of them, neither was worth anything, and their independent progress was declared impossible.

every truth is either true absolutely or not at all, and that if it is true, it cannot be rendered truer by being 'deduced.'

§ 6. *Verification*

Formal Logic has a very poor opinion of *Verification*. It cannot 'prove.' To infer, from the fact that the observed consequences are such as they would be if a hypothesis were true, that therefore the hypothesis is true, is 'fallacious.' For the observed consequences might result as well, or better, from another hypothesis. The fallacy is that of 'affirming the consequent' (Chap. XVII, § 2), and Verification is liable to it, because it does not make sure that there is strict reciprocity between the cause and the effect. We must be able to argue, not 'if the theory is true, the effect will be so and so, it is so and so, therefore the theory is true,' but 'only if the theory is true,' etc., *i.e.* if the effect can be attributed to that theory alone.

It is clear, therefore, that from a Formal standpoint the situation looks very black for the Verification of truth-claims by their working. Yet such verification seemed to be the only safeguard actual reasoning had to offer to the scruples of Logic. There was no security in the formulation of the claim, which might be due to a guess, or a fancy, or a postulate, and seemed hopelessly 'arbitrary' and 'subjective.' Verification alone seemed to appeal to something 'objective,' though even that was merely 'empirical.' Yet now, it seems, Verification also breaks down utterly in the eyes of Formal Logic. It was hardly necessary, therefore, so sedulously to omit all references to it in denunciations of the 'arbitrariness' of voluntarist accounts of knowledge.

From the Formal standpoint all this is true, and if that standpoint were tenable the consequences to scientific reasoning would be very serious. 'Valid' reasoning would have to proceed either from 'self-evident' certain principles, or would become impossible, and the ordinary reasonings of empirical science which appeal to Verifica-

tion would have to be ruled out of order. Science would, in short, be restricted to a choice between scepticism and apriorism.

Perhaps, however, the situation is more serious for Formal Logic than for Science, and it is the former that falls into the pit it had digged for empirical science. It had to admit under cross-examination that 'reciprocating causes' are very rare—nay, that the elimination of plural causes is 'only an ideal' (Chap. XX, § 9). We had to object that this was no ideal for science, and to deny that reciprocating causes were in fact attainable. We have also denied that self-evidence has any logical value (Chap. XVIII, § 3). Moreover, whatever *a priori* principles we might now choose to accept as 'self-evident,' would still have to be verified by their working. For after all no one could guarantee the continuance of their 'self-evidence' in the future, either for himself or for others. Hence apriorism is impossible.

But is scepticism the sole alternative? For the Formal logician doubtless; for no amount of discrepancy between his 'ideal' and the actual procedure of science induces him to doubt the former.

But for a logic which is not so intransigent towards the facts the difficulty is not insuperable. In fact there is no difficulty. Its answer to the attack on Verification is to concede all that was asserted, and to deny that it matters. It is perfectly true that Verification does not yield absolute certainty; because nothing does. It is perfectly true that it is not Formal proof; because Formal proof is impossible. It is perfectly true that no amount of Verification yields finality and justifies repose; but then finality would mean the end of science, and repose the end of scientific activity. It is perfectly true that inferences from 'effects' to 'causes' are risky and not cogent, and that 'verified' hypotheses may require to be improved and even discarded; but what does this matter, if risk is inseparable from real reasoning, and willingness to make improvements is the condition of scientific progress?

Thus once again the notion of Formal proof appears impossible, and the logical values dependent on it prove unattainable. The real alternative for Logic is whether it will obstinately adhere to it and for its sake declare knowledge impossible, or will abandon the Formal ideal.

CHAPTER XXIII

FALLACIES

§ 1. *The Notion of Formal Fallacy*

A *Fallacy* is a reasoning which may be known to be 'bad' from an inspection of its form. Or more technically and strictly, it is an argument which appears to be conclusive, when in fact it is not so, by reason of some offence it has committed against the rules of Formal Logic. Its reasoning is thus 'bad' or 'unsound,' in the sense that it is *Formally inconclusive* or invalid, and it is thus the counterpart of a Formally valid reasoning. It is clear, therefore, that the notion of Formal 'fallacy' stands and falls with that of Formal 'validity.' If there is good reason to dispute the existence and possibility of Formally valid reasoning, it follows that there can be no such thing as reasoning which can be known to be bad by the vice of its form.

It would be possible, therefore, to argue that as Formal Validity had revealed itself as an impossible 'ideal,' the notion of Formal Fallacy also must be discarded; but it will be more instructive to start afresh, and to examine whether the Formal doctrine of Fallacies is in fact coherent and intelligible on its own showing.

The first difficulty which presents itself is that of discovering what precisely a formal fallacy is held to prove. May we take it that it proves the actual unsoundness and falsity of the 'fallacious' reasoning? That, no doubt, is the impression apt to be left by the Formal doctrine, and it is, perhaps, not infrequently shared by

the Formal logicians themselves. But it clearly does not follow.

(1) Formal Logic has nothing whatever to do with real truth. It has set aside the distinction between true and false by choosing as its subject the conditions of Formal 'validity.' This definition has substituted the distinction between the Formally 'valid' and the Formally 'invalid' for that between the true and the false, and henceforth no inference leads from the one to the other. A Formally valid thought may be actually false, and a Formally invalid thought may be actually true. Hence the presence of Formal fallacy is no disproof of the real worth of an argument, and does not really dispose of it, a fact which no doubt explains the vitality of 'fallacies' in real disputes. The technical and Formal 'badness' of an argument, in short, proves nothing as to its real value, and no inspection of its form will entitle us to dismiss it without going into the real evidence behind it.

(2) The Formal definition of Fallacy is defective, and leaves vital questions undecided. It says nothing about arguments which are Formally inconclusive and known to be such, but nevertheless used as evidence and considered to have some value, even though that value is not supposed to amount to 'proof.' It does not tell us how to judge them. Are they 'fallacies' or not?

(*a*) If they are, *all probable reasonings*, *i.e.* all reasonings which fall short of absolute proof, will be 'fallacies.' But so far as we have been able to discover, this applies to all reasonings whatsoever. Shall it be admitted, then, that all actual reasonings are 'fallacies'? Formal Logic would probably shrink from this paradox, though it is quite consistent with its principles, and, as we shall see (p. 354), it is not in the end very far from the admission of this conclusion itself.

(*b*) The only alternative would seem to be to explain that an inconclusive argument is a 'fallacy' only when it is taken to be conclusive, *i.e.* when its real character is not perceived. Its fallaciousness will then consist in its *deceptiveness*, in its pretension to cogency, in the

illusion it tries to engender as to its value. This again is an interpretation which the actual treatment of Fallacies by logicians might well be used to support. It yields a plausible differentiation of 'fallacy' and 'probability.' For example, an Undistributed Middle can hardly be called a fallacy, if the inference drawn from 'Nearly all crabs live in water; this is a crab, therefore it lives in water,' merely means to assert the probability that the animal is not a land-crab.

But to conceive Fallacy thus is nevertheless Formally inadmissible. It is to make the differentia of a fallacy its capacity to deceive the reasoner (or rather its failure to do so), and this is to make the conception 'psychological.' The same reasoning is 'fallacious' or not, according as it deceives or not. It may therefore be a 'fallacy' to one reasoner and not to another; or rather there can only be 'fallacy' when this is the case. For alike when both parties are deceived, and when both perceive the real value of the argument, there is no 'fallacy.' But all this is 'psychologism' with a vengeance, and defines the notion of Fallacy as lying essentially in the relations of the reasoning to human minds, which it both deceives and fails to deceive. Formal Fallacy thus means human ignorance as to the real value of an argument. Further, it once more follows from this definition that *all* arguments are 'fallacies,' since no human mind can claim to be completely aware of the *whole* value of an argument, and every one must admit at least the theoretic possibility that some of its implications have escaped him. But, if so, his ignorance of its real value may always render the argument deceptive for him, and so fallacious.

§ 2. *The Futility of the Notion of Formal Fallacy*

It would seem, then, that Formal Logic itself unwittingly and unwillingly testifies to the difficulty of defining the notion of Fallacy, and to its uselessness for the purpose of distinguishing good reasoning from bad.

This result, however, need surprise no one but a Formal logician. For if the notion of Formal Validity is incompetent to act as a guide to actual reasoning, the fear of Formal Fallacy must be equally incapable of acting as a deterrent. In practice the notion of 'Fallacy' shows its impotence in four sorts of inability: (1) to distinguish between recognized 'fallacies' and other arguments which are not Formally 'conclusive'; (2) to deny that these latter, though not 'cogent,' may nevertheless be valuable; (3) to distinguish 'fallacies' from *valid* forms of reasoning; (4) to show that the recognized forms of Fallacy are more than *verbal*. The all-pervasiveness of these defects will best be illustrated by going through the traditional list of Fallacies, and showing how futile they render the Formal treatment of all these 'errors of reasoning.' For this purpose it will not be necessary to go into the intricate and unprofitable disputes as to how Fallacies may best be classified, and under which head the various fallacies fall; it will suffice to accept the commonest of these classifications, that into *Formal*, *Material*, and *Semi-logical* fallacies.

§ 3. *The Formal Fallacies*

The strictly Formal Fallacies are *Undistributed Middle*, *Illicit Process* of the Major or of the Minor Term, and *Quaternio Terminorum*, of which Ambiguous Middle is a shining example (cf. Chap. XV, § 2). To these we may add *Affirming the Consequent* and *Denying the Antecedent*, if we decline to reduce 'hypothetical' reasoning to 'categorical,' and so to reduce these 'invalid' procedures to Undistributed Middle and Illicit Process of the Major. The *Assumption of False Premisses*, which is also sometimes mentioned under this head, is clearly not a Formal fallacy. For Formal Logic is neither able nor entitled to pronounce *when* premisses are 'false.'

It will be observed that these Formal Fallacies defy the Rules of the Syllogism, and are therefore Formally as reprehensible as possible. Yet reasonings which commit them may, in fact, have considerable value.

For example, the real value of an argument which has an 'undistributed middle' will depend on how completely or probably the middle in the two premisses may be identifiable in spite of its offering no formal guarantee of identity. From 'All the clever boys got prizes; all the hard-working boys got prizes,' it is not unreasonable to infer that 'All the clever boys were hard-working,' in spite of the Formal 'impossibility' of a positive conclusion in the second figure (Chap. XV, § 2). Nor will it be misleading to infer from 'All Liberals hold these opinions; he holds these opinions,' that 'He is a Liberal,' if only the opinions are distinctive enough, so that practically none but Liberals hold them.

In the case of *Illicit Process* the formal defect of the reasoning consists in inferring about the whole of a term what is *known* only of part of it. But this does not necessarily deprive the argument of actual value. For the unknown factor need not actually invalidate the inference. What is true of the part *may* be true of the whole. Moreover, if the known part is very nearly the whole, the Formal defect may actually be negligible.

Further, the Formal defect is usually to be cured by 'converting' one or the other of the premisses, and this we may actually be entitled to do, although we may not know it as yet. The test-case here is that of the formal validity of 'Induction' (Chap. XIX, § 2). Here the 'cases' enumerated function as the middle term, and if the enumeration can be made exhaustive, it is clear that the minor premiss can be 'converted,' and the reasoning turned into a formally valid syllogism in *Barbara*. Hence it was natural to conceive 'exhaustion' as the 'ideal' of Induction. But can it seriously be contended that until exhaustion is attained the enumeration of cases has *no* logical value, and that as confirmation pours in it does not become more and more probable that '*all* S is P'? If so, would it not be vain to try to argue from 'cases' at all?

As for the Fallacy of *Four Terms*, we have seen that

many logicians hold that many arguments which are 'valid' habitually commit it (Chap. XVI, § 11). But we also saw that a *purely verbal* transformation will cure this defect. So that here, apparently, the difference between a 'fallacy' and a 'valid' reasoning is, in the opinion of Formal Logic itself, entirely verbal.

Still more significant is the case of the *Ambiguous Middle.* We saw in Chap. XVI, § 6, that no one could tell by looking at the abstract form of an argument whether or not it would involve an 'ambiguity' in the Middle, whenever any one tried to make an actual application of the form. But what does this mean but that Formal Logic *is unable to distinguish Formally between a gross 'fallacy' and its supreme form of 'valid' reasoning*?[1]

Concerning the Fallacies of *Affirming the Consequent* and *Denying the Antecedent* it may suffice to say that the reasoning is good if in any case the 'cause' may be taken as 'reciprocating' with the 'effect,' and that whether it may or not is a question which inevitably arises in every attempt to reason from the relation of 'cause' and 'effect' (Chap. XX, § 9, Chap. XXII, § 6). Formally, therefore, a 'good' reasoning from a 'reciprocating' cause is indistinguishable from a 'fallacious' one in any case where reciprocation cannot be assumed for the purpose of the argument.

[1] It may plausibly be contended, indeed, that this difficulty is still more far-reaching. If the middle term may develop 'ambiguity' in use, owing to the special context to which it is applied, does not the same principle apply also to the other two? *E.g.* 'The members of the Oxford Alpine Club dine once a year, X. is a member of the O.U.A.C., ∴ he dines once a year.' How can we argue from S (or P) in one context to S (or P) in another? Clearly there is, in asserting their 'identity,' a *risk*, which we can deny only if we deny absolutely that the context can make any difference at all, and conceive our 'terms' as absolutely rigid. But this is plainly false in fact, and only tenable in theory if the 'identity' of the terms is referred either to the identity of the *words*, or to the abstraction from context which is incidental to the *unapplied* form. Hence the Formal doctrine of the Syllogism's 'three terms' only holds either of the words or of the *unused* form. So soon as we try actually to reason, our 'terms' may double in their contexts, and our 'syllogism' may develop *six* terms, and lead us astray. This is the truth in Herbert Spencer's doctrine that every 'valid' syllogism always *has* six terms, because the identity of any term in two appearances is a fiction. But Spencer did not see that this fiction is needed in order to reason, and that the risk involved is tested by the issue.

§ 4. *The 'Material' Fallacies*

These, of course, look like a gross inconsequence. To a consistently Formal logic material error should be as indifferent as material truth. But as the name is there, and there is a list of them, and it is not uninstructive to examine them, we may proceed to note that they cause Formal Logic just the same embarrassments as the Formal Fallacies.

I. The list of the Material Fallacies is headed by that denominated the *Fallacy of Accident.* It is defined as an attempt to argue *falsely* from a rule which is true in general to a case in which, *owing to particular circumstances*, the rule does not hold. The traditional illustration is 'What you buy to-day you eat to-morrow; you buy raw meat to-day, therefore you eat raw meat to-morrow.'

The first comment which suggests itself on this 'fallacy' is that there is a real scientific problem involved, of which the 'fallacy' has caught a misleading glimpse. It has perceived what the rest of Formal Logic has either failed to see or been careful to conceal, viz. that there always are 'particular circumstances,' that there is a real difficulty in applying a rule and arguing from a 'law' to a 'case,' because it is possible to *misapply* rules and necessary to find the *right* rule for the case (Chap. XXI, § 5). But it seems strangely perverse to disguise this very important discovery in the shape of a 'fallacy.' The problem involved is precisely that of *all* deductive reasoning. We are always reasoning from a universal rule to what we take to be an example of it; we are always liable to find that we were mistaken, and that the rule does not apply in this case. If, so soon as we apply a rule, we become liable to a 'fallacy of Accident,' a new and startling light is thrown on the use of rules. For if they may betray us so soon as we try to use them, they are indisputable and *safe* only while they are *not* applied. Here, then, is the reason why Formal Logic, which has instinctively scented the danger, fights so shy of application in its pursuit of

a priori safety. Yet what is the use of *inapplicable* rules? How can they retain a meaning? This difficulty also Formal Logic more than half suspects. But its notion of meeting it is by secretly abstracting from meaning altogether, and making this abstraction its fundamental postulate (Chap. XXIV, § 5). Thus, either by leaving its doctrines inapplicable, or by disclaiming all relation to meaning, Formal Logic contrives to escape empirical confutation. But it is hard to see how either can be supposed to help *us*. For in all our reasoning we may still fall victims to the Fallacy of Accident, though we can give this name to our failure only after the event. Nor can any study of Formal Logic protect us against this risk; our risk is simply that of all real reasoning, and it is indifferent whether we ascribe it to the Fallacy of Accident or to Ambiguity of the Middle (cf. Chap. XVI, § 6).

Again, if our Formalism so far unbends as to allow us to conceive the tendency to this 'fallacy' psychologically, and we accordingly follow Lotze in declaring it the characteristic fallacy of the *doctrinaire* who will not admit that circumstances alter cases and affect the application of rules, we shall yet have to point out that formally this intellectual vice of taking particulars as cases of the wrong 'law' is indistinguishable from the valuable quality of seeing them as cases of the *right* law.

II. The *Converse Fallacy of Accident* is defined as *wrongly* turning what is true under the peculiar circumstances of a case into a general law for all cases. Or more technically, whereas the Fallacy of Accident argued *a dicto simpliciter ad dictum secundum quid*, it goes *a dicto secundum quid ad dictum simpliciter*. As examples we may quote the fanatical opponent of alcohol or gambling who argues from the extreme cases of ruinous vice that whoever drinks a drop or stakes a penny is doomed to die a drunkard or a gambler. Here we have essentially the same situation as before, the relation of the 'law' and the 'case' and the amount of qualification which application to the latter demands in the former.

Clearly we may go as wrong in starting from the case and not perceiving that the case is peculiar and must not be generalized as in starting from the law and not seeing that it has to be adjusted to the case. And just as our former failure could be correlated with doctrinairism, so our present error may be connected with narrow-mindedness and inability to disentangle a general law from its particular applications. Psychologically both vices are of course common enough; some minds can never accommodate their vague generalities to facts, others can never see beyond facts. But, again, why should this be noted in Formal Logic, and noted as a 'fallacy'?

It would seem, moreover, that the distinction between the two fallacies of 'Accident' is in practice highly artificial. Which name is given to our error, *after* our failure has convinced us that we have made one, all depends on whether the 'rule' we choose to think of has the 'case' for its 'fallacious' application, or is conceived as itself a special case of a more general rule. Thus drinking brandy may be conceived either as a case of taking 'poison' or of taking 'medicine'; in the one case the 'fallacy' will consist in supposing that what is poison in general is so also in small quantities (*accident*), in the other, that what is medicinal in small quantities is so also in large (*converse accident*). But whether the reasoning is or is not sound does not depend on its form at all; it is simply a question whether we have selected our 'case' rightly and found the applicable rule for it.

III. The Fallacy of *Ignoratio Elenchi*, or *Irrelevant Conclusion*, originally meant something quite definite, viz. arguing to the wrong point, and proving something else than the 'confutation' (*i.e.* the contradictory) of an opponent's thesis in a discussion. From missing the point to be proved it has been extended to mean irrelevant argument in general, without definite reference to an opposed thesis. But the detection of Irrelevance is utterly beyond the power of Formal Logic.

(*a*) For the relevance of any part of an argument

depends on the purpose of the whole and a knowledge thereof, and Formal Logic thought it clever to simplify its task by ruling out the relation of reasoning to purpose (Chap. I, § 3).

(*b*) Relevance is excluded from Formal Logic not only because of its relation to purpose, but also on its own account. For the relevant is never more than a *part* of the whole (Chap. VIII, § 5), and Logic has always officially professed to aim at all-inclusiveness. References to considerations of relevance have only trickled in quite recently and surreptitiously among English logicians,[1] and it is significant that the only language which possesses a clear and complete vocabulary for the conception is the English.[2]

(*c*) If irrelevance is to be treated as a 'fallacy,' all error ought to fall under this head. For all error is 'not to the purpose.' Moreover, in all reasoning the real question is always whether the relevant has been properly extracted, and the irrelevant duly excluded. But this question cannot be decided by recognizing the Formal possibility of an 'irrelevant conclusion.'

(*d*) Even if *Ignoratio Elenchi* is restricted to its original Aristotelian sense, it still is not a formal fallacy. As a syllogism its reasoning may be perfectly valid, and may prove its conclusion flawlessly. That the conclusion proved is not that required in its actual context on this occasion cannot be discovered by contemplating its form. To detect it, therefore, demands knowledge of the actual context and use, and *psychological* knowledge, to boot, of the point aimed at in the actual discussion.

It may further be pointed out that even if Formal Logic could consistently deal with this fallacy, it would yet be quite unable to explain wherein it differed from a sound argument. For the difference between what are relevant and irrelevant considerations under any circumstances is never formally obvious. Indeed it is often, and even usually, a difficult and disputable question, which the

[1] Dr. W. R. Boyce Gibson and Prof. Stout here deserve honourable mention.

[2] Thanks, not to logicians, but to Scotch lawyers. See the *Oxford English Dictionary*, *sub voce*.

Formal naming of the 'fallacy' does not help us to decide. As an illustration of this 'fallacy' the writer was once given in an examination the statement, 'When Socrates was accused of corrupting the youth, he replied that his accuser *did not know the youth*.' But it is obvious that if Socrates had been inspired to make this defence, its relevance would at once have struck every juryman with a sense of humour and a knowledge of the morals of the young bloods of Athens. Even in the stock illustration of *Ignoratio Elenchi*, the brief marked 'No case; abuse the plaintiff's attorney,' the irrelevance only seems obvious because the *words* seem to admit that the defendant has no case. For it is not in general true to say that the character of the advocates of a view is irrelevant to our estimation of its value. But even in this case it is permissible to suppose that the defendant may have had 'no case,' merely because a charge had been trumped up so skilfully that no *legal* refutation seemed feasible; so that, though he was innocent, his only *relevant* defence was to insist on the evil character of his opponents and their notorious skill in suborning false evidence.

This particular form of 'Irrelevance,' which attacks not the case but its advocates, has received the special name of an argument *ad hominem*. Others have been similarly equipped with technical names, *ad populum*, *ad captandum gratiam*, *ad misericordiam*, *ad hoc*, *ad baculum*, etc. In each case there may be a dispute whether in any particular use the appeal is in fact to circumstances which are irrelevant. At any rate such appeals are constant and inevitable just because the reasoners are human, and all arguments make them more or less. No audience, for example, can help being impressed to some extent by a speaker's fine presence, show of sincerity, melodiousness of voice and eloquence of diction, and prejudiced by their contraries; yet who will say that these things are strictly 'relevant'? Unfairness, bias, prejudice, preconception, preparedness, openness to conviction shade off into each other insensibly, as does

open-mindedness into indifference; nor, if a man could be found who was wholly free from every sort of bias, would he be the best reasoner; he would more probably be quite indifferent, or an idiot. Thus truth as well as error may be elicited by what is Formally 'irrelevance,' and the valuable and the worthless are generated by the same process.

IV. *Petitio Principii*, or *Begging of the Question*, is another 'fallacy' that exhibits no formal defect and can be detected only by a knowledge of its context. Again it is necessary to know the actual aim and purpose of the argument. Supposing this to be known, the nature of the 'fallacy' can be defined as assuming as part of the grounds for a conclusion a proposition which itself rests on the truth of that conclusion. The effect of this procedure will be that ultimately two propositions, neither of which have been proved to be true, are used alternately to 'prove' each other, by an *argument in a circle*, and the 'fallacy' is refuted by extracting these two propositions, and displaying their interdependence. A good example is in A. R. Wallace's *Darwinism* (p. 167): "In pre-Darwinian times it was so universally the practice to argue in a circle, and declare that the fertility of the offspring of a cross proved the identity of species of the parents that experiments in hybridity were usually made between very remote species, to avoid the possibility of the reply: 'They are both really the same species'; and the sterility of the hybrid offspring of such remote crosses of course served to strengthen the popular belief."

The offence of this fallacy so far seems plain and heinous enough, and yet it is wonderful how hard it is to distinguish formally between 'arguing in a circle' and *arguing in a system*, which is so far from being regarded as 'fallacious' that it is even conceived as the ideal of consistency. For arguments in a system also seem to cohere and support one another, and that whether the system is true or false. No wonder, therefore, that thoroughly coherent and consistent reasoners, such as were a few of the metaphysical system-builders, always seem to their

opponents to argue most irritatingly in circles, and to have begged every question that was worth discussing.

The Fallacy of *Petitio Principii* has, however, a further claim to be regarded as a nuisance by Formal Logic. For it bears so strong a resemblance to the Syllogism, that all the enemies of the latter have always accused it of being a *petitio* which systematically 'begged' the conclusions it professed to 'prove.' We have seen that this charge was by no means unfounded (Chap. XVI, § 9), and even that no Formal conception of the Syllogism can escape from it; at any rate it is indisputable evidence of the difficulty of distinguishing 'valid' forms from formal 'fallacies.'

V. The Fallacy of *Non Sequitur* seems to have the advantage that we may symbolize it formally, without travelling outside a single syllogism and being forced to inquire into what is actually in a reasoner's mind. It denotes so glaring an absence of logical connexion between the premisses and the conclusion of an argument, that the conclusion 'does not follow' and the whole structure falls to pieces. It thus indicates a profounder departure from continuity of thought than was revealed by an *ignoratio elenchi*; the *Non Sequitur* fails to cohere, not only with the general train of thought, but even with itself.

Incoherence of mind is, of course, as psychologists know, common enough, and it is no wonder that it should trouble also the logicians; but it cannot be said that their formal analysis of the defect is a success. After all it will not do to condemn an argument merely because its conclusion does not *verbally* seem to you to follow from its premisses; to know what its real point and real force are, it is necessary to have some understanding of the reasoner's mind. This knowledge is no doubt strictly 'psychological'; but it really is not safe to infer that the logical thread of connexion has been severed because you cannot trace any verbal identity between the terms in the conclusion and in the premisses. The apparent *non sequitur* may be merely due to an elliptical

statement on the part of the reasoner, or even to a use of language you do not understand; actual inquiry may show that there is a good connexion lurking in his mind, though it does not appear on the face of his argument. Nor again can you infer that because there is a *non sequitur* for you it exists also for him, and that *you* are right about it. It may only be that he goes too fast or too deep for you, or that you are stupid and cannot see the connexion. This indeed is the retort which profound thinkers (*and impostors!*) have always made, to the commonplace critics who 'cannot follow' their abstruse reasoning. All that an 'inability to follow' a train of thought, therefore, really proves is that the reasoning is *either* 'fallacious' and a *non sequitur*, *or* sound (perhaps), but too difficult for the vulgar; but *which* of these alternatives is the truth Formal Logic has no means of telling us.

VI. *False Cause*, or *Post hoc ergo propter hoc*, is almost openly beyond the reach of Formal analysis. For it consists in asserting a causal connexion which is false, and in mistaking a sequence for a consequence. But seeing that a mere sequence of events is all that we ever start from in our search for causal connexion (true or false), that 'events,' sequences, and 'causes' are all of them selections of our making (Chap. XX, § 3), and that the risk of arguing from sequences to consequences has to be taken by all inferences good or bad, it is clear that no Formal criticism of this 'fallacy' is attainable. Before denouncing it logicians should have exhibited a little sympathy with the concrete difficulties of science, the history of which shows that the 'true' 'cause' has been slowly discriminated from the 'false' only by its success. And rightly; for how was any one to tell *a priori* and merely from his prepossessions as to what were 'true causes,' and without long watching and experimentation and manifold mistakes, that there existed differences in the efficacy of 'heavenly bodies' so enormous that whereas the sun controlled all terrestrial processes, the moon affected only the tides, and the planets and the stars

nothing at all (to speak of), and that therefore the influence of the moon on the weather and of the planets on individual lives were 'false causes,' and astrology was not a 'science' but a 'superstition'? The *ex post facto* verdict of logic is merely an idle insult to the vanquished in the struggle for existence of scientific theories.

VII. The Fallacy of *Many Questions*, lastly, is defined as the putting of questions to which no simple answer can be given, so that if an answer is attempted, the respondent is ensnared whatever he replies. At first sight this 'fallacy' appears to be merely verbal, and many of the examples given of it, such as the famous, 'Have you left off beating your father?' or, 'When did you give up drink?' are in fact merely verbal tricks which could amuse only the childish.

But to dispose of them it is nevertheless necessary to introduce two new principles, both of which Formal Logic must veto. In the first place, it is not really obligatory to answer *yes* or *no* to a question which cannot be adequately answered thus. It is often legitimate to refuse to answer altogether, or until the question has been re-worded, on the ground that *as put* it was confused, or unmeaning, or ambiguous, or obscure, and that you do not understand what its meaning was intended to be.[1] In such cases the proper logical answer is to ask, 'What do you mean?' or to reply, '*Yes* or *no*, according as you mean one thing or the other.' But to give the logician a right to go beyond the verbal form and to inquire into the real meaning is a second novelty of the utmost importance, and Formal Logic could not concede it without committing the happy dispatch. Its game would be up, if it were once admitted that not every verbal question is a real question, and that it is often imperative to go beyond the form of words, and to demand information about the actual meaning.

But Formal Logic not only takes verbalities too

[1] Why should there not be a 'Fallacy of the Unmeaning Question,' etc., as well as of 'Many Questions'?

seriously; it also does not take the real complexities of thought seriously enough. It assumes that the nature of the 'fallacy' of Many Questions is quite plain and that any one can see whether a question is simple, and whether to answer it would betray the answerer. But this is by no means easy to determine. Because all subjects are more or less connected, no question is as simple as it looks; because all minds are more or less coherent, a man's attitude towards one question more or less reveals his position towards others. Hence in real life even the most innocent and straightforward questions and answers may disclose far more than they say, and be eloquent of the character, views, and even secrets, of the parties to the conversation. True, these again are matters of 'psychology.' But if Formal Logic rejects its aid, what means has it of deciding either when a question is multiple, or when questioning is unfair and 'fallacious'?

For after all it has been overlooked that such questioning may compel the respondent to reveal truth, as well as to entangle himself in verbal falsehood. The art of *Cross-examination* is rightly regarded as one of the law's most potent methods for eliciting truth from reluctant witnesses. Yet what is Cross-examination formally but a systematic practice of the 'fallacy' of Many Questions? True, each question may individually admit of a simple answer; but the series as a whole does not, and its aim is to get the (? lying) witness to commit himself by putting to him questions of which he does not see the interconnexion and the scope, so that however he answers, his answers may collectively betray him. Sometimes it may be very disputable whether a question is unfair and fallacious or not. Thus the famous question which Abraham Lincoln put to Stephen Douglas, when they were rival candidates for the Illinois Senatorship, as to whether slavery should be introduced into a new settlement against the will of 99 per cent of the inhabitants, if it were legal, was in one sense fair enough. Yet Lincoln foresaw that 'if he

answers it one way, it will lose him the Senatorship' (by offending the Northern Democrats); 'if he answers it the other, the Presidency' (by offending the Southern Democrats, who, in fact, split the party, and so brought about Lincoln's election in 1860). Here again, then, Formal Logic cannot discriminate between a 'fallacy' and a 'valid' form.

§ 5. *The 'Semi-logical' Fallacies*

These are presumably so called because logicians did not know how else to accommodate them. The term seems indefensible, for they must either belong to logic or not. But whether or not they are 'half' logical, it is clear that they are more than half psychological and wholly verbal.

We get a hint of this verbalism from the Aristotelian name for these fallacies *in dictione*,[1] but in fact the name designates fallacies of 'ambiguity,' and ambiguity is of course taken in a merely verbal way (cf. Chap. II, § 8). As might be expected, therefore, the Formal treatment is successful neither in dealing with the real difficulties of thought, nor even in distinguishing the 'fallacies' from the 'valid' forms.

I. The head of the list might well be made to cover all the rest; for *Equivocation* could apply to all cases of words that can be used in several senses, and so may possibly mislead. We have also seen that equivocation in the middle term constitutes the Formal Fallacy of Ambiguous Middle, and similar ambiguities might occasion also Illicit Processes; so the classification of these 'fallacies' does not seem to be formally a happy one.

What is more serious, however, is that Formal Logic conveys the impression that *some* words alone are ambiguous, and that the rest may be misused with impunity (cf. Chap. II, § 8).

In reality *all* terms are used in a context, and have their actual meaning in that context, and more-

[1] παρὰ τὴν λέξιν.

over, to reason with them, we *must* transfer them from one context to another. Consequently there is *always* a question whether this transplantation has succeeded, because the difference between the meaning in the two contexts is irrelevant for the purpose of the argument, or whether the transfer has affected their meaning and rendered them 'ambiguous' (cf. § 3). A possibility of 'Equivocation,' therefore, *i.e.* of *real* ambiguity as distinguished from 'plurality of senses,' is always present, and cannot be treated as a mere question of form. Whether it has occurred or not can be decided only from a knowledge of the subject-matter and the precise context of the argument. The logical illustrations of this fallacy are fictitious paper cases, such as would not occur in real thinking.

II. *Amphibology* is a special form of ambiguity, consisting in the use of a phrase which may be construed variously, and is supposed to have been the great resource of prophets and oracles desirous of 'hedging.' When the Delphian Apollo encouraged Croesus to attack Cyrus by telling him that if he crossed the Halys he would destroy a mighty empire, he was committing an 'amphibology.' And the writer once heard an audience of philosophers solemnly accept as an authentic quotation from William James the reading, 'If you are radically tender, you will take up with the Mormonistic form of philosophy' ('more monistic'!). This, if we do not choose to dignify it with a separate title or to classify it alternatively as a fallacy of 'Accent' or of 'Figure of Speech' (*q.v.*) rather than as an amphibology, seems to show that not only sentences but single words may be misconstrued. Indeed Formal Logic might fairly be required to warn us that the possibilities of misconstruction are endless. There is nothing that cannot be misconstrued, and probably nothing that has not been; and in most subjects the misconstructions are gross, extensive, and persistent. But they are never merely formal, and cannot be exposed without a knowledge of real minds and real meanings.

III. and IV. The Fallacies of *Composition and Division* are usually defined as confusions between the distributive and the collective senses of terms (Chap. II, § 7). To argue that 'All the angles of a triangle are equal to two right angles' (collectively), and to infer that 'therefore the angle ABC is equal to two right angles' (distributively), will then exemplify the error of wrong *Division*; while 'All the angles of a triangle are less than two right angles, ABC, ACB, BAC are all the angles, therefore ABC, ACB, and BAC are (together) less than two right angles' (collectively), will illustrate wrong *Composition.* Or again, to argue that because England is a rich country, any individual Englishman is rich, will be a fallacy of Division; while to infer from the fact that a protective duty on foreign competitors will benefit each trade, therefore a general tariff will benefit all, may be held to savour of that of Composition.

As they are usually stated, these catches are merely verbal and laughable, and in real life they would be easily eluded either by asking 'What do you mean?' or by denying that the real nature of the argument had been correctly represented. For example, our third case would in the concrete probably arise in the context of a hotel bill and mean that a certain traveller would stand pretty stiff charges, while in the fourth case the argument for protection is certainly subtler and less puerile than it is made out to be. Even J. S. Mill's famous 'proof' of Utilitarianism,[1] which on the face of it seemed to argue from a universal desire of all men for their own happiness to a desire for the general happiness, is neither as simple nor as fallacious as a mere 'fallacy of Composition.'

Logic, however, might also be required to note that the scientific problem of arguing from parts to wholes and from wholes to parts is much too complex to be settled by the mere labelling of a couple of 'fallacies.' Under what conditions may we presume that a character which is found in the cases of a kind pervades it and is predicable of it as a whole, and conversely, when are the characters of a whole

[1] *Utilitarianism*, chap. iv.

predicable of its parts? How, in other words, does a science determine what qualities of a 'kind' are 'essential,' and what only individual? The answers to these questions are clearly not matters of form but of real knowledge, and the facts that the parts and the wholes have both to be distinguished *by us*, and that any 'composition' and 'division' may in a sense be called arbitrary, do not render the problem of right reasoning about such matters more amenable to Formal treatment.

V. The Fallacy of *Accent* is consecrated to misunderstandings arising from a wrong distribution of emphasis on the words of a sentence. The printer who inserted italics in 'And he said, "Saddle me the ass," and they saddled *him*,' and the translator of the Psalms[1] who did not foresee to what a heresy he would be committed by the slightest stress on 'name' in 'Praise the Name of the Lord; for His Name only is excellent,' may serve to illustrate this 'fallacy,' though both examples are only jokes that could not really deceive in their context. It is more important to remark that as all languages rely largely on emphasis, intonation, and gesture to convey meaning and to discriminate between serious assertion and irony or jest, it is clear that there is here a great field for misunderstandings. But mere knowledge of the verbal form will not usually enable us even to suspect them. It should, moreover, have occurred to Formal Logic that there must always be *some* distribution of emphasis, and whatever it is, it may fail to convey the meaning intended. For example, the most scrupulous monotony of voice in reading aloud (which has been recommended as a specific) would be no protection against a 'fallacy of Accent,' if it produced an impression that the book was a very dull one. The question, *Which* is the right accent, and *which* the wrong? is not, in short, one of form, but of fact.

VI. The list of the 'Semi-logical' Fallacies tails off miserably with the Fallacy of *Figure of Speech*. It is the most trivial of these ambiguities, and consists in

[1] Ps. cxlviii. 13.

mistaking one part of speech for another, and though this might conceivably occur to persons who have an imperfect knowledge of a language, Formal Logic here does not seem to afford much assistance even to grammar. Logically, it seems less worthy of enumeration than many other traps for the unwary. For example, the fallacy of 'proving too much,' though doubtless rarer than that of proving too little, and its relation to the argument *a fortiori*, might well engage logical attention.

§ 6. *Miscellaneous Fallacies*

We have seen that the enumeration of Fallacies is not only vain but also incomplete, and in a sense Formal Logic may be said to perceive this. For in addition to the fallacies we have considered it also applies the name to certain other misleading arguments. To do so, however, it has to extend the notion of 'fallacy,' and no longer takes it as denoting formal inconclusiveness, but general trickiness or deceptiveness.

Under this head come most of the great 'fallacies' which have won their name and fame in antiquity, and been conscientiously recorded ever since. They are, however, the most valuable, as well as the oldest, part of the traditional logic, being really interesting, because they raise real philosophic problems in an agreeable if somewhat puzzling form, and cannot possibly be represented as depending on mere questions of form.

The Zenonian 'fallacies' about the impossibility of motion, for example, bring out real difficulties in the conceptual construction of Space and Time. The '*Arrow*' cannot move if its continuous path is really made up of discrete sections with real halting-places marked off at A, B, C, etc., at each of which we say the arrow '*is*.' It is easy to reply that of course the arrow cannot move, if it has to move by jumps, but that this representation utterly fails to make the arrow's path continuous, as it must be in fact. But if the path is really made continuous, is it not made unknowable?

For do we not calculate the continuous by *feigning* that it is composed of discrete sections? Three important problems, then, which are mooted by this fallacy are that of the nature of continua, that of the 'correspondence' between our percepts and our concepts, and that of the value of scientific fiction; and what alone is 'fallacious' in the Zenonian statement is that its whole meaning is not to be elicited without questioning.

Much the same may be said about the famous race of *Achilles and the Tortoise.* The problem here is that of the relation of the infinite divisibility of conceptual Space and Time to the real (perceptual) motions we *measure* by our concepts. If it is true that to every thinkable interval there must correspond a real experience, Achilles can only catch the Tortoise after an infinity of events has elapsed, *i.e.* never. For there will then be events corresponding to the thoughts of 'Achilles-running-a-yard,' and 'the-Tortoise-crawling-a-tenth-of-a-yard,' and of 'Achilles-running-a-millionth-of-a-yard,' and 'the-Tortoise-crawling-a-ten-millionth-of-a-yard,' etc., and the Tortoise's start, being infinitely divisible in fact, can never become zero. But if we deny that such 'correspondence' need be assumed, *i.e.* deny that 'truth' need copy 'reality,' or if we put the problem as being that of finding at what point and after how long a slower body with a certain start will be overtaken by a faster, the objection to the victory of Achilles will be found to disappear. Thus the answers are different according as the 'fallacy' was *meant* to raise one question or another, and once more, the paradox is to be censured only for the ambiguity of its expression, and the question, which can always be put to a real assertion and is only ruled out by an artifice of Formal Logic, 'Do you mean this or that?' if it is admitted, will cut short its career.

The *Sorites,* which asks how many grains of sand make a heap, or how many sheep a flock, has the merit of drawing attention to the difficulty and arbitrariness of 'drawing the line' in the application of our terms to reality. On the other hand, it shows reprehensible laxity

in the use of technical terms that Formal Logic should also denominate Sorites two forms of syllogistic reasoning, which have no *raison d'être*, beyond that of occasioning some rules about their formal validity.

The foolish mother who bargained with the *Crocodile* about the restoration of her baby should, of course, have made further inquiries before accepting the treacherous monster's proposal to restore her child, if she would tell him *truly* whether he intended to do so or not. For the crocodile's offer was really very indeterminate (or rather *indefinite*) in its wording. Nothing was said about any criterion of his intention, and of the 'truth' of the mother's answer. And in all probability, if the question of the meaning of truth had been raised, and the crocodile been required to digest all that has been written on this subject, he would have preferred to give up the baby unconditionally.

The fallacy of *Fatalism*, involved in the Ἀργος Λόγος of the sick man who declined to call in a doctor, because it was certain that he would either die or get well, involves a similar indetermination in the conditions. Did he think that the result was fated, whatever human agency could do, or did he take the human agencies as fated too, and his own refusal to be itself one of the unalterable conditions of a fully-determined order of events? If so, he had merely to explain that the belief in alternatives to the actual order of nature was an illusion, and that he 'could not help' refusing, to win the respect of every consistent determinist, and an admission of the cogency of his reasoning.

Epimenides, who said 'All Cretans are liars,' and then, by admitting that he himself was a Cretan, is supposed to have initiated an apparently endless series of proofs and disproofs of the truth of his assertion, was also deplorably indefinite in his statements. Did he mean by a 'liar' one who lied always and never deviated into truth-speaking? Did he think that from the *untruth* of 'All Cretans are liars' it could be inferred with formal validity that he, a Cretan, became a regular George

Washington who always spoke the truth, and so had to be believed also when he declared all Cretans to be liars?

Or is it permissible to whisper the solution commended by common-sense psychology? If we might inquire what Epimenides *meant*, it would probably appear that when he *said* 'all Cretans,' he *meant* all *other* Cretans.

But, if so, there is no logical difficulty at all about the real meaning of Epimenides, if only it is treated *as his assertion*; the whole paradox arises only when it is treated *as an independently significant form of words*. And all it then proves is that such forms of words may turn out to be nonsense, and frustrate the aim of verbalism.

There is raised, however, by such factitious puzzles, a grave question of principle. Epimenides having failed to *say* what he *meant*, is the concern of Logic to be with what he has actually *said* or with what he has actually *meant*? In real life there would be no doubt about our choice; both courtesy and common-sense would allow assertors to purge themselves of 'contradiction' by explaining what they meant (cf. Chap. X, § 2). A real logic, therefore, would not consider it fair or reasonable to pit *the meaning of the words* against *the meaning of the man who used them*, nor regard it as 'illogical' to ascertain his actual meaning. It is only to a completely verbalized and formalized logic that it seems natural and congenial to assume that the actual meaning is 'psychological' and inadmissible, whereas the meaning of the words is so indisputably 'logical' that it must not be questioned, even when it ends in paradox and nonsense.

However this may be, Epimenides has been transcended by the logicians who gravely consider the dilemma of the king who erected a gallows on his frontier, and required all who crossed it to declare *truly* what they were going to do in his realm, under penalty of being hanged if they lied, and then was nonplussed by a wag who declared that he was going to be hanged on the gallows, or the less picturesque, but simpler, case of the man who declares 'I lie.' Yet it should occur to the logicians to advise the king to hang the fellow, and then

to justify himself formally by pointing out that though the announcement had been that all liars were to be hanged on the gallows, and he had spoken the truth, yet there had been no pledge that the gallows should not be utilized also for pestilent knaves who quibbled with the king's majesty. As for the declaration 'I lie,' and the answers *yes* to the question 'Are you asleep?' and *no* to the question 'Are you alive?' it may again be suggested that logicians should look at the context,[1] and would do well, at this point, if not before, to contemplate the psychological possibility of *jokes*, and the logical possibility of meaningless forms of speech. In real life the admission 'I lie' would no doubt either be a joke or else refer to what had gone before; but of course there is nothing in a form of words to prevent a humourist from collocating them in as 'self-contradictory,' *i.e.* meaningless, manner as ever he pleases.[2] The cure for such diversions is always to ask what is meant, and to insist on a real meaning; but Formal Logic has to regard this as an unprofessional excursion into 'psychology.'

This indeed is the great lesson of the Formal treatment of 'Fallacies'; the formal analysis everywhere reveals its inadequacy, and leaves us a choice between verbalism and 'psychology.' This conclusion, however, entirely accords with those we have reached elsewhere, and fortified by the agreement of our results, we may now drag Formal Logic to its final reckoning and settle our account with it.

[1] Thus when M. Valdemar in Poe's *Tales* exclaimed, "For God's sake!—quick!—quick!—put me to sleep—or, quick!—waken me!—quick!—*I say to you that I am dead!*" the reader finds that he is faced, not by a logical paradox, but by a psychological horror.

[2] In modern times Mr. Bertrand Russell has delighted the philosophic world with many puzzles of this sort, most recently by giving as an example of an 'unknowable truth' the statement that 'all the multiplication sums that never have been, and never will be, thought of by any human being, deal with numbers over a thousand' (*Journal of Philosophy*, viii, 6). Before treating this either as a 'proof' or as an 'antinomy,' however, it might be well to ask Mr. Russell to remove the indefiniteness of 'multiplication sum' and 'thought of,' lest their ambiguity should turn out to have destroyed the meaning of his problem!

CHAPTER XXIV

THE OUTCOME OF FORMAL LOGIC

§ 1. *The Notion of Formal Logic*

We have tried so far to conceive the traditional body of logical doctrine as a consistent system of what we have called 'Formal Logic,' and in view of the reticence or carelessness of logicians about their fundamental assumptions, have defined it by two criteria. What makes a logic Formal is (1) the belief that it is possible to consider 'formal validity' as a thing apart and independent and to abstract from 'material' truth, (2) the belief that it is possible to treat 'logic' without regard to psychology and to abstract from the actual context in which assertions grow up, viz. the time, place, circumstances, and purpose of the assertion and the personality of the assertor. Both these abstractions are plainly of the nature of simplifications, and analogous to other similar assumptions in other sciences. Still this does not establish their soundness and guarantee their success. Nor have they been adequately discussed, though the very definite consequences they carry with them are in a general way affirmed by the traditional logic, which, however, nowhere appears to work them out completely, consciously, and consistently. It seemed our duty, therefore, to attempt to do this, in order to test whether Formal Logic would in the first place yield a coherent system, and then to see whether it could be regarded as a successful account of thought, or even of the current topics of Logic. Accordingly we must now

sum up our results and consider what light they throw on the questions (1) whether Formal Logic does form a consistent system, (2) whether it succeeds in dealing with the recognized topics of Logic, and (3) with actual human thinking and knowing.

§ 2. *Is Formal Logic consistent?*

This question has clearly answered itself. At no point in its career has Formal Logic been able to adhere consistently to its fundamental assumptions, or to work out its doctrines with an ordinary regard for the laws of consistency. It has nowhere been able to dispense with assertions which involve a knowledge of human psychology and 'material' fact. To remind us of its shortcomings in these respects, it will probably suffice to refer to its treatment of the two central notions of (1) Judgment and (2) Inference.

(1) Formal Logic was forced by the requirements of its position to defy what it regards as the supreme law of consistency, the Principle of Contradiction, in its definition of Judgment. In order to get a strictly Formal definition of Judgment, and to avoid discussing questions of the real truth of judgments, it had to define *all* judgments as 'true,' and to ignore the existence of 'false' judgments. It accepted, that is, *truth-claims* as adequate evidence of real truth, and took 'truth' in a sense in which it *includes* 'error' (Chap. VIII, § 3).

Yet, finding it no less imperative to distinguish Judgment from other 'psychological' processes, it had *also* to define Judgment as the intellectual process or function which could be *true-or-false* (Chap. VIII, § 4).

These two definitions, however, are hopelessly inconsistent with each other. The second reintroduces the conception of falsity, which the first had ruled out, and at once leads to the inference that *some judgments are not true*; and this is either a direct contradiction of the formal doctrine that '*all judgments are true*,' or a fatal inconsistency in the use of the notion of truth,

and a covert admission that the attempt to treat the formal 'truth' (which includes error), without regard to the real truth (which excludes it), has broken down.

(2) In its treatment of Inference the inconsistency of Formal Logic is no less glaring. It is constrained to hold *both* that truth forms a superhuman coherent system of eternal truths which are rigid and immutable, *and also* that there are transitions from point to point of this ideal structure, which are somehow to be 'real novelties.' *I.e.* these transitions, though real, are to fall *within* the rigid system and to entail no mobility of its parts. There are to be 'inferences' *without inferring*, and the 'new' arrived at is always to be *old*, without detriment to its 'novelty.'

Now the only way of satisfying the requirements of this 'paradox of Inference,' which for over 2000 years any logician has been able to suggest, is to take these novelties, not as occurrences in the uneventful realm of Eternal Truth, but as *enlightenings of human ignorance*, privileged to catch growing glimpses of the immutable system.

Hence Formal Logic is compelled to admit that strictly *all novelties must be 'psychological.'* They should, therefore, be for it taboo. But with 'novelty' admittedly goes 'Inference,' which must finally be declared to be Formally 'extra-logical.' How then can Formal Logic consistently continue to discourse about the 'valid forms of Inference'? (cf. Chaps. XIV, § 5, XVI, § 7). And what becomes of its initial disclaimer that nothing 'psychological' concerned it? Had it been content to be a human science, it might have been pardoned a human degree of failure to attain its own ideal; but in view of its pretensions it cannot be judged so leniently.

§ 3. *Can Formal Logic cover the Traditional Logic?*

Here again we may be brief, in view of our results. If we set ourselves to ask how many of the traditional topics can legitimately fall within the purview of a consistently Formal logic, we should have monotonously

to exclude one after the other. So let us ask instead to what consistency would reduce the Formal view. The answer must be, to very little. For in the first place the whole theory of 'Induction' must go, not because it has failed to describe scientific procedure, but because it has failed to vindicate its own formal validity (Chap. XIX, § 1). But the true Formal logician can, perhaps, it is thought, dispense with 'inductive' logic; its formal failure does not greatly grieve him, and its scientific failure even rejoices his heart; for he is proud to believe that no actual science attains to his ideal requirements. The situation gets more serious when Inference is expunged as psychological (§ 2), and rigour demands that Judgment too should be declared 'extra-logical' (Chap. XI, § 8). Yet it is undeniable that Judgment always involves an 'arbitrary' *selection* from a larger whole, and so is both 'psychological' and a departure from 'reality.'

Nothing then remains but an 'ideal of thought,' which consists in the single system of eternal truths aforesaid (§ 2). But how can that be called the 'ideal of thought' which presupposes the abolition of thought? And how is this 'ideal' to be attained? No means seem to be provided of knowing it, and so, *pace* Plato, there is no reason whatever to think that it exists. The 'World of Ideas' seems to be nothing but a *bad* inference from the human use of ideas, and bad because the latter does *not* exhibit the characters postulated for the Ideas. For human ideas are not independent of man, not indifferent to human needs, not unaffected by their use, and not immutable. Is not the World of Ideas, then, a mere fairy-tale which may amuse the Formal logician, but leaves the traditional problems of Logic unsolved and insoluble, and has no relevance to any process of human knowing?

§ 4. *Can Formal Logic deal with Actual Thinking?*

This, our next, question has really been answered. If the Formal 'ideal' has completely dehumanized itself, it

is for ever divorced from every actual problem of science or life. It scorns, and is bound to scorn, any problem which is relative, and relevant, to any questioning, doubting, inferring, experimenting, testing, reconsidering, human intelligence, to any decision (which whether bold or cautious is always *risky*) about the real ('material') truth of any assertion, and to any truth which arises in, and refers to, a concrete context in space and time. But such problems are the whole concern of human knowers. All the problems of real knowing, therefore, which Formal Logic deigns to mention, it eviscerates of their meaning and casts aside.

But it does not mention all of them. Its reticence is remarkable. There are some extraordinary *lacunae* in its scheme, even if it is construed with the traditional laxity or liberality. We have in expounding and criticizing the traditional doctrine had frequent occasion to mention and to use a number of conceptions which are of primary importance and indispensable to the analysis of real thinking, such as *Meaning* (and with it, of course, the communication and taking of Meaning, *i.e. Understanding*), *Truth*, *Error*, *Selection*, *Relevance*, and *Risk*. But not one of these has a chapter devoted to it in any Formal logic.

Nay more, the Formal doctrine really rests on their exclusion, and this is why the incidental and perfunctory references to these topics which we found were so incoherent and inconsistent.

In most of these cases the lack of logical recognition is clearly not accidental but intentional. *Risk* is excluded, as we saw (Chap. XVI, § 7), because it is the aim of the notion of 'formal validity' to transcend all risk. *Relevance* and *Selection* are treated similarly, because the Formal 'ideal' is all-inclusiveness, and cannot recognize preferential emphasis on the important, whereas 'relevance' implies selection of the 'helpful' *part* from a whole of which the rest is left behind as 'irrelevant.' Selection, moreover, is a responsible *act*, and so cannot be purely 'theoretic'; it is also volitional, and so must be 'arbitrary.'

Error is excluded because the notion of Formal 'fallacy' (Chap. XXIII) takes its place; and *Truth*, because, in the first place, Formal Logic has not any real notion of Truth (having excluded reflection upon its nature), and, secondly, is compelled to use the term in *two* incompatible senses (§ 2). The case of *Meaning* may be reserved for the next section, but even without it it does not seem strange that a discipline which ignores these topics should be incapable of grasping actual thought. But is it not still stranger that such a discipline should be *called* a science of Thought? Ought it not rather to be dismissed as unmeaning?

§ 5. *Is Formal Logic meaningless?*

As this question has come up naturally, it must be discussed. It might be discussed as a final, but not unprovoked, expression of disgust with the general futility of Formal Logic. But it will be more profitable to discuss it quite specifically, and with reference to the last of the *lacunae* we have just noted in the programme of Formal Logic.

We may well ask, What does the absence of a discussion of *Meaning* mean? It is certainly a very extraordinary fact; for Meaning is the first and most fundamental of the problems of thought. It must be raised even before the question of Truth; for if an assertion does not mean anything, it is vain and unmeaning to ask whether it is true—in any sense whatever. Hence the omission to recognize a problem here is vital, and highly significant. But does it mean that Formal Logic has merely not noticed the existence of a problem of Meaning, as in the case of Truth, or that it has neglected it as clashing with and inconveniencing favourite assumptions of its own, as in the case of Risk, Relevance, and Selection, or that it has despaired of it, as in the case of Error? Or does it mean something still more important and discreditable?

It will be necessary here to revert to our discussion of the Laws of Thought (Chap. X) and the question of

what was meant by the Law of Identity. We saw that in its traditional form, as '*A is A*,' this fundamental 'Law of Thought' was obscure and confessedly unmeaning (Chap. X, § 1). It also seemed to be obviously incompatible with the form of significant assertion, '*A is B*' (Chap. X, § 5). It had, therefore, to be interpreted to give it a meaning. We accordingly took the liberty of interpreting it as a postulate, namely, as the postulate that objects of thought should be found to persist as such, without changing in such a way as to falsify our predications (Chap. X, § 10). But we did not discuss what significant assertion might involve and what its law might be. Nor did we imagine that our interpretation of Identity would commend itself to the Formalists.

Nor, of course, does it. The few Formal logicians who have concerned themselves with the problem of giving a meaning to the cryptic formula 'A is A,' explain it quite differently. It means, they hold, the 'eternity' or immutability of Truth: 'Once true, always true,' 'If A once, then A always.' Or as Prof. G. F. Stout puts it for them (more plainly),[1] it means a claim that "the truth of a proposition is unaffected by variation of time, place, and circumstances, or of the minds which apprehend it," or otherwise, that the context and the making of the judgment do not affect its 'truth.'

Now this is a very important and interesting claim, which reveals the inwardness and aim of Formal Logic as nothing else has done. It is not an accident, or an oversight, or a blunder, but a deliberate policy. Predication is to be set free thereby from all dependence on events in time and place and all subservience to the personality and needs of the knower. And this is to be done by laying it down as the primary Law (i.e. *postulate*) of Thought that 'A' is 'A' wherever it occurs, eternally and immutably. The 'Universal' is to be freed from the vicissitudes of events and the risks of misapplication; the different occasions on which 'A' is asserted by

[1] In his very enlightening preface to Miss Jones's *New Law of Thought*.

different persons for different purposes in different contexts are not to affect its 'identity,' or at least are to be treated as not affecting it. That 'A is A' is to be an absolute truth and the basis of all others, and the knowledge of the universal *per se* is also somehow supposed to yield a guarantee that it will not be misapplied in use.

It is well, however, not to make all this too plain, lest it provoke objections or at least questioning.

(1) It is difficult to see how to vindicate the eternal truth of 'A' (*per se* and unapplied) is to protect us against misapplication of it in the concrete, and to guarantee the truth of any particular 'A,' or what, if the Law as such is not concerned with the difficulties of applying it, is the value of an absolute truth which can never be applied.

(2) Manifestly, therefore, this 'eternal' truth of 'A' overlooks or abstracts from the mundane possibility of *false* assertion of A, and so commits us to a setting aside of the problem of Error and of any sense of Truth in which 'truth' is *distinguished from* 'error.' This, however, is consistent with the Formal conception of Judgment as 'true' formally, absolutely, and infallibly, and with the identification of truth and truth-claim.

(3) It seems sordid, and is probably vain, to object that the doctrine appears to be in fact false, and ruinous to any distinction between 'true' and 'false.' For how can mere truth of fact impede the flights of Formal Logic? Why point out, then, that the *real truth* of any judgment is always relative to the context which generated it, and to which it is applied? The 'material' falsity of its postulate will only enhance its value in the eyes of Formal Logic, and augment the 'independence' of its 'formal validity.'

(4) But we have not yet fathomed the full meaning of the doctrine. It means a good deal more. It means that the judgment's *actual meaning in its context when made* is not to be allowed to complicate the logical situation. It means *abstraction from actual meaning*, as

well as from actual truth, and reveals this as the deepest foundation of the whole superstructure of Formal Logic, a foundation too deep for the language of common-sense criticism to sink to it.

That actual meaning depends on context is manifest. What, *e.g.*, 'It is hot' means depends on who says it, why, when, where, to whom, about what; and all these questions are particular. Again, real truth depends on the value of the truth-claim *meant*, and not on the abstract 'meaning of the words.' To abstract, therefore, from the particular context in which the judgment arises, to universalize it without regard to its application, is not only to abstract from its ('material') truth or falsehood, but also to abstract from its meaning altogether. *If Formal Logic makes this abstraction, it is in the strictest and completest sense meaningless.*

§ 6. *The Law of Significant Assertion*

That such is, in fact, the real character of Formal Logic, and the ultimate source of its peculiarities, we have long suspected, and upon occasion hinted. It comes out best, however, if we study the conditions of Significant Assertion. Here we may begin by guiding ourselves by Miss Constance Jones's interesting little book, *A New Law of Thought and its Logical Bearings*. After showing that 'A is A' is unmeaning, Miss Jones starts from the form of significant assertion 'A is B,' and asks how it is to be interpreted. Her answer is that it means to assert an '*identity of denotation* (*i.e.* application) in diversity of connotation' (*i.e.* 'dictionary-meaning,' cf. Chap. II, § 3). Although *S* and *P* as terms are different, yet the judgment claims that they denote, or apply to, the same thing. While in general and in the abstract it would be ludicrous to identify S and P (as *unused* notions and in their dictionary-meanings), yet on this occasion of their actual use they both apply to the same object. *E.g.* 'The Morning Star is the Evening Star' does not mean that the idea of a star shining in

the evening is identical with that of a star shining in the morning, nor that the judgment would be true whenever made, *e.g.* if made about newspapers; it only means that in this case both terms apply to the same celestial body, otherwise known as the planet Venus. What, therefore, a significant judgment really means is a *claim* that for an actual purpose the two notions ('dictionary-meanings') symbolized by 'S' and 'P' may be combined and applied to the same thing or situation. The actual meaning, therefore, is always the *meaning-in-use*, and meaning in general is rendered dependent on use or application.[1]

Now it is evident that this analysis of Significant Assertion is wholly incompatible with the Law of Identity as construed by Formal Logic. So far from attempting to free the 'truth' of 'A' from the vicissitudes and risks of the particular occasions on which it is used (successfully, *i.e.* 'truly,' or otherwise), it insists that it gets its meaning from its application, and that until it has been equipped with a meaning it is meaningless to inquire whether it is 'true.' Thus, not only the 'truth' but the very meaning of the 'universal' lives in and for its applications to particular cases, and to render it inapplicable is to render it unmeaning. So far from holding the truth of the Law to be 'absolute,' it holds that the mere aspiration to absoluteness must be purchased by the sacrifice of significance. So far from regarding it as 'self-evident' that 'A is A,' it regards it as the

[1] At first sight this doctrine seems incompatible with the 'fourfold analysis' of propositions in extension ('denotation') and intension ('connotation') (Chap. III, § 1), and indeed Miss Jones herself takes it thus. Closer examination, however, does not support this impression. The Law of Significant Assertion is much more fundamental than the 'fourfold analysis.' It states the primary condition of there being meaning at all, viz. that 'terms' must be used, and so converts 'dictionary-meanings' into actual meaning. It is only after this has been done that the further question arises whether we are using our terms to indicate 'things' or their 'qualities' (attributes), and it is with this that the fourfold analysis is concerned. Even propositions, therefore, which on paper seem mere connexions of attributes, like 'Virtue is knowledge,' must be applied to a context to become judgments, and must then 'denote' this context; it is, moreover, this application which renders possible the 'identification' of the diverse attributes which, as terms, remain different. The difficulty, therefore, arises from an ambiguity in the term 'denote,' which in Miss Jones's use means actual application, whereas in the Formal analysis of propositions a term is said to 'have denotation,' if it is merely *applicable* to things.

meaning of every assertion to raise and test the question whether 'A' *is* 'A' or only *called* 'A.' And so far from holding that this question, and the risk of error which it avows, is a defect to be eliminated or ignored in logical thinking, it holds that it is precisely this risk, and the desire to settle this doubt, which gives the impetus to thinking and a meaning to assertion. So far from holding that 'A' is immutable simply because it does not change its name, it holds that it always changes (more or less) from one application ('case') to another, and that therefore there is always a question whether the 'identification' will succeed, and the change be irrelevant, and not fatal to the proposed application.

There are very good reasons, then, why Formal Logic should fight so shy of the logical notions enumerated in § 4. The mystery of the missing chapters in Logic is solved when we realize that Formal Logic rests on an abstraction from Meaning, and was consequentially bound to ignore (real) Truth, Error, Selection, Relevance, and Risk. For all these are bound up with real Meaning, and essential to its constitution. Whoever, then, *wants* his logic to be meaningless must rule out also these other implications of real Meaning; and conversely, whoever wants to rule out one of the others, commits himself to an abstraction from Meaning. But are we not entitled to complain that, if this was the real meaning of the proposal to consider forms in their purity, Formal Logic should have had the candour to admit this honestly in the beginning, instead of having it extorted from it reluctantly in the end?

§ 7. *The Defence of Formal Logic*

Is this the end of Formal Logic? Can it survive the discovery that its fundamental abstractions have committed it also to a complete abstraction from meaning? At first it seems incredible that in a rational organization of human life there can continue to be room for an unmeaning pseudo-science, and still more that this

should actually be accepted as the orthodox theory of Thought to the exclusion of a logic of real meaning, real reasoning, and real knowing.

But a knowledge of the world and of the actual working of human minds and institutions will hardly bear out the hasty optimism of this expectation. To prove Formal Logic radically incompetent, inconsistent, and finally unmeaning is a deadly attack upon its scientific character. But is it enough to destroy it as a science in being? This by no means follows. Many of the defects we have found in it have always been known to be 'difficulties'; a good many more have been extensively suspected. In spite of them, Formal Logic has managed to flourish for two thousand years. The parallel with 'Euclid' is more instructive than encouraging. The facts that some of the foundations of Euclidean geometry were unsound, and that many of its proofs were lacking in rigour, were known to mathematicians for centuries; but they did not prevent its use as a text-book continuing for over two thousand years. The scientific breakdown of Formal Logic is doubtless more complete; but to an even greater extent than 'Euclid' it has managed to become a tradition and an *institution*, supported by literary and educational conventions, and the academic spirit everywhere. As an institution Formal Logic gives instruction to a large percentage of the ablest minds, and employment to a large number of able men, all of whom are professionally averse from a radical reform of their subject, all of whom have their logic lectures written out, many of whom have committed themselves in print, while not a few, and among these precisely most of the senior 'authorities,' have undergone that hardening of the mental fibre and loss of its elasticity which age and dogmatic habits tend to bring about. How, then, is it psychologically probable that logicians will adopt, consider, or even understand, far-reaching novelties of thought? A mere proof, then, that Formal Logic is scientifically nugatory and intrinsically unmeaning is hardly sufficient to destroy its academic status. It will

damage, it may even paralyse, it will probably infuriate; but it will neither reform nor kill.

Indeed it is much more likely that the attack will really put Formal Logic on its mettle. For over two thousand years it has lorded it unopposed over the submissive human mind, and played the 'Old Man of the Sea' to the 'Sinbad' of Science, and has never encountered any serious questioning of its principles. This has not only been bad for humanity (cf. Chap. XXV), but also for Formal Logic itself. It has become brutally and blindly dogmatic, and unaccustomed to argue reasonably. It will now have occasion to develop some ingenuity in justifying its continued existence, in spite of the indictment brought against it.

It will be well, therefore, that we should consider some of the excuses for its existence that will be alleged, in order to see whether we cannot effect a compromise with so redoubtable an adversary. For after all both prudence and collegiality admonish us to withdraw, if possible, our objection to the very existence of Formal Logic, and to allow it to go on, if in return it will only consent to let us construct a theory of real meaning, real truth, and real knowing, and give us leave to appreciate the procedures of Science. If Formal Logic can tolerate by its side a logic of human knowing, it becomes comparatively harmless, and we can then consider whether it can justify itself either as *mental training* or as an *intellectual game*.

§ 8. *Formal Logic as Mental Training*

A defence of Formal Logic on the ground that though it is not true it forms an excellent mental training, is worth considering, though it hardly seems adequate, and a large body of educational experts would dissent from it.

For (1) Formal Logic does not in fact seem capable of getting a grip on a large proportion of human minds. They either fail to acquire it, or are influenced by it only by way of repulsion. Indeed a real taste for it seems to be as special as that for mathematics, though much rarer,

even among philosophers. Hence only a small proportion of those who benefit by a training in philosophy can be said to take at all kindly to Formal Logic. The rest find it dull, distasteful, and unprofitable. Even in the university which still assigns most importance to logical training in its curriculum, that of Oxford, the percentage of those who study it is small, the extent to which they study it is slight, and the benefit they derive from it is doubtful.

(2) Indeed, a general doubt may be raised as to whether Formal Logic is in fact a good training even for the minds it can influence. It not infrequently appears to induce a deplorable narrow-mindedness and incapacity to grasp concrete fact, which in extreme cases amounts to a sort of mental paralysis.

(3) Experience does not seem to bear out the belief that Formal Logic improves reasoning. It frequently produces 'logic-chopping' and 'quibbling' of an unprofitable kind, without increasing coherence and vigour of thought. That it should do this is not, perhaps, surprising, in view of the actual character of Formal Logic.

But it is a curious fact that it does not even seem appreciably to improve the formal accuracy of thinking. Formal logicians are apparently just as liable as other mortals to fall into formal traps, *e.g.* to argue from ambiguous terms or to convert *A* propositions wrongly. The reason probably is that just because Formal Logic is so alien to real thought its lessons are cast to the winds so soon as any one begins to do his real thinking. The pedantry which paralyses the free movement of intelligence has to be thrown off, even by the logician, when he applies his mind to any intellectual problem.

(4) It is surely a misfortune that the mental training (whatever its value) which Formal Logic provides, should profess to have for its subject (or victim) anything so vitally important as the theory of Knowledge, and specifically of Science. For men of science and their sympathizers may legitimately ask why, if it is desired to indoctrinate men with meaningless falsehoods in the

guise of 'mental training,' it should have been necessary to select the theory of science as the proper subject about which the possession of *false* ideas should form part of a 'liberal education.'

(5) Moralists might dispute alike the propriety and the use of needlessly teaching falsehoods for the sake of mental training; and lastly, (6) the pupils of the Formal logicians might themselves discover, and resent, the fact that they had been taught as truth what was false, or even meaningless.

On the whole, therefore, it does not seem that a very strong case can be made out for Formal Logic as mental training.

§ 9. *Formal Logic as a Game*

Formal Logic gets on much firmer ground when it claims to be a good game for intellectually-minded men, or at all events for Formal logicians. For from this point of view most of the objections to it fall to the ground. It will no longer matter that it has severed all connexion with real knowing, that its ideals are impossible and its objects fictitious, non-existent, and unmeaning. They may be all the better for this, as counters in an intellectual game. And such games surely are legitimate. If a logician takes aesthetic pleasure in the thought of a superhuman Ideal of Pure Thought and loves the pure unearthly beauty of its simple laws and outlines, and feels that to contemplate it amuses him, or even does him good, why on earth should he not be allowed to devote his leisure to it?

Let us defend him, therefore, against the Puritanical Philistines who would intolerantly suppress him as the useless practitioner of a futile pseudo-science, and plead with them as follows:—

'Friends, your judgment is too harsh. You must not judge Logic by your own feelings, nor condemn it because you have no use for it. You should live, and let Logic live. Moreover, it really has a use. Its use is to keep logicians employed and amused. The study of Formal Logic makes

a highly intellectual game, which has its rules, intricate and difficult enough to call forth the highest intellectual skill. You think it a silly game; well, in a sense all games are silly. It is, at all events, a fairly harmless game, and playing it will not make the world either appreciably wiser or sillier. Why then prohibit it? You need not play it yourself. If it amuses logicians, why should they not play it? Are not they too entitled to have amusements? We cannot all be working all the time, but need relaxation; remember *neque semper arcum tendit Apollo.* So long, then, as these logicians exist and society thinks them worth having and endowing, have they not ordinary human rights? It is not every one who has a head for chess or bridge. If they were not allowed to play at Formal Logic, there is no saying what they might not do. After all, there are not many of these logicians, and they are not greatly on the increase. And lastly, we can assure you that even Formal Logic has an incidental use. On several occasions during the past two thousand years logicians have hit upon truths which were of serious import for the theory of real knowing.'[1]

In defending Formal Logic, we have had, however, to repress a serious misgiving. Is it really such a good game, even for those who like it? Can that be a good game of which the rules are so loose and the terms so ambiguous? It is trying to use ordinary words in technical senses which have to be forced upon them by fictions and conventions; but its fictions cannot be worked consistently, and in practice they keep slipping back into their ordinary senses. Hence throughout Formal Logic

[1] The humble tone of this defence will probably seem to the pure logicians hopelessly inadequate to the dignity of their subject. But it might appease the Philistines, who, they should remember, form the vast majority, and have it in their power to confiscate the professorships of Logic, and to endow with the proceeds 'really useful' chairs of engineering or agriculture. And in that case not only Formal Logic, but the whole theory of (real) knowing would be relegated to another world; which would be a pity, because it is still quite a young science which has been so overshadowed that it has never yet had a chance of showing what it can do for the good of humanity. There is a very serious danger in these days that the democracy will try to suppress all intellectual pursuits which do not justify themselves by their direct and obvious social service, and in view of this it seems most dangerous to boast of the 'uselessness' of higher culture and 'theoretic' science.

seems to be highly suggestive of the game of croquet played by Alice at the court of Wonderland, with hedgehogs as balls and flamingoes as mallets. And the worst of it is that some of the 'pure' logicians are of the same opinion. They propose, therefore, to make the rules more rigorous, and to substitute (unvarying) symbols for words, assuring us that this will much improve the game and extend its scope. And it seems plain that on Formal principles they are right, and that the old-fashioned logicians have not answered them because they cannot. They call this new game *Symbolic Logic*, and exhibit so much ingenuity that it is impossible not to speak of it with awe. To examine its claims fully would demand much space and much abstruse knowledge. But it may suffice for our purposes to give three reasons why it cannot be accepted as the right solution of the logical problem.

(1) Practically Symbolic Logic cannot be a substitute for Formal. It is too new and too difficult to have settled down to any teachable traditional form. It is not therefore as yet *examinable*, like Formal Logic, which, though it is strictly nonsense, has the advantage that it is eminently examinable nonsense, which (with care) can be taught even to the Oxford Passman, and is found by him easier to assimilate than quite elementary mathematics. Symbolic Logic, on the other hand, presupposes not only a mathematical turn of mind, but also a good deal of mathematical knowledge.

(2) *Symbols are not meanings, but only forms for them.* Each symbol can actually convey a multitude of meanings in different contexts. If a mathematician declares (in a context) that $x = y$, he implies that his equation holds whatever values are given to x and y in any actual case.[1] But he may equally well write also '$x = 2y$,' and inspire the Symbolic Logician to start an inquiry whether the two propositions '$x = y$' and '$x = 2y$' form a 'contradiction.' Verbally insoluble puzzles may thus be manufactured, until it is realized that so far these symbolic

[1] Though not, of course, that intrinsically and *per se*, x and y are equal.

forms *mean nothing, because no one has yet asserted them.* Both are (abstractly and potentially) true, because the values of either formula may be useful; neither is *actually true*, because no one is actually meaning and using them, and until there is a meaning there can be no contradicting of it. The only advantage, therefore, symbols have over words, is that they are not so *easy* to juggle with; but when human ingenuity has triumphed over honesty in dealings with them, the trickery is much harder to detect. Symbolic Logic, then, though its symbols are less liable, perhaps, to misuse than words, is still essentially *verbal*, and as impotent (or impenitent) in its attitude towards real meaning and actual assertion as the loosest Formal Logic. And in the end it falls into the same embarrassments.

(3) Symbolic Logic, therefore, is still Formal, and makes a game of the same kind as Formal Logic, played with symbols instead of words. Indeed it is the same thing, only more so. It is much more consistently Formal. But it shares the fundamental assumptions of Formal Logic, though it is clear-headed enough not to endorse all its untenable claims about the real validity of its results. It is in fact essentially an attempt to cure what is *formally* the main defect (though practically the chief asset) of Formal Logic, viz. that its terms are so loose and 'ambiguous.' But Symbolic Logic thinks that they can be *fixed* by conscientious and elaborate definition, and for ever after kept from 'wobbling,' so that the insensible shifting and growth of actual meanings will no longer disturb the gyrations of Logic.[1]

This, however, is an entire mistake. It is the nature of living thought to modify and develop the terms it uses, because it is *psychologically impossible to judge* without claiming some degree of *novelty* for the combination of terms effected by the judgment, and so modifying the old 'meaning of the terms' used by their new associations, and our proper policy, therefore, is not

[1] *Noli turbare circulos meos*, it might reply (like Archimedes) to the demand for progressive knowledge.

to try vainly to arrest this growth, but to learn to reason with *plastic* terms and growing meanings, and to understand the process. To have to play with hedgehogs and flamingoes does not mean that we can have no fun, but only that we had better *not* pretend that the game to play with them is croquet.

§ 10. *Concessions to Psychologic*

Nevertheless the logic of real thinking need not try to prohibit the Formal game, with whatever counters its champions prefer to play it, if in return it can obtain a few reasonable concessions.

(1) The Formal logician must be asked to give up his intolerant dogmatism and to admit that logics can be constructed on other assumptions than his own.

(2) He must be asked to confine himself strictly within the formal limits he has marked out for himself, and must not pronounce upon those logical topics which involve a knowledge either of 'material' truth or of human psychology.

(3) He must be required to recognize that actual human thinking in science and in ordinary life forms a real problem which urgently needs to be considered. As he has made it quite clear that his initial assumptions forbid him to consider it, he must leave its consideration to others. It will be necessary to devise a *new* science which will *not* abstract from psychology and real truth and meaning, but will deal with actual meaning and the difficulties of conveying it and of mutual understanding, with material truth, real error, the processes of judging and inferring, the activity of human thought in interfering with data, postulating, feigning, guessing, and experimenting, with its arbitrariness and selectiveness, with its rejections and prejudices, its desires and emotions, and the influence (for good and evil) of all such things on knowing. He himself has, rightly or wrongly, scorned to plunge into this psychological 'mess.' But this mess has to be cleared up somehow. If he refuses to let

this discipline be called logic and claims pre-emption of the name, we must not haggle with him about terms. Provided that he will let us frame a science which will concern itself with the aspects of intellectual functioning which are excluded from the Ideal of Pure Thought, let him restrict 'logic' to what *he* means thereby.

We shall merely have to adopt another term. Let us call this other study *Psychologic*, therefore, and demand the right to cultivate it by the appropriate methods. It will extend over the whole field of human knowing and try to understand the sciences which are engaged in discovering truths, and the practices of actual reasoning. And when it has understood these, it may be able modestly to make some very general suggestions for conducting such procedures, which may have practical value, and will at any rate evince real understanding.

Thus will contentions cease and interscientific peace be restored. Formal Logic may be left to its own devices henceforth, and Psychologic will study real knowing without impediment. But there remains a final problem, viz. Will society ratify this compromise? Is it well, on social grounds, to leave Formal Logic alone? This important question will occupy our final chapter.

CHAPTER XXV

THE SOCIAL EFFECTS OF FORMAL LOGIC

§ 1. *The Social Importance of Formal Logic*

WE saw in the last chapter that it was perfectly possible to effect a compromise between Psychologic and Pure or Formal Logic, which is scientifically tolerable. Formal Logic can be conceived as a sort of intellectual game which Science can afford to ignore as an irrelevant by-product of the development of knowledge. But can society afford to despise it as a harmless craze? The answer will depend on the view taken of its social effects.

(1) Contempt, at any rate, seems quite uncalled for. However inconsistent and unreasonable Formal Logic may have shown itself, however incapable of appreciating real knowing, it is not something to be despised, but something to be *feared*, for the enormous influence it exercises upon human thought and social action.

Practical common-sense will doubtless be astonished to hear this, and loth to admit it. It will think it a great exaggeration to attribute any appreciable social importance to Formal Logic and its errors. It will point to the facts that the exponents of Formal Logic are few, and that their writings are obscure and not read by the general public. It will urge that in point of fact the world is not managed by theorizers of any sort, but by practical men who find out the way to do things by trying, and trouble themselves not at all as to whether their methods are 'theoretically sound,' and approved by the pedants and pundits of the universities.

Nevertheless it is possible to give reasons for thinking that common-sense is in this case wrong, and is greatly underrating the potency of Formal Logic. It has overlooked both the direct educational effects of Formal Logic and also the influence which it exercises indirectly through Science and Religion. And, however unimportant one may wish to think Logic, who will dare to think the same of Science and Religion?

§ 2. *The Educational Effects of Formal Logic*

The educational effects of Formal Logic have already been discussed from the point of view of their value (Chap. XXIV, § 8), but not as yet from the point of view of their extent. It will be found that the educational position of Formal Logic enables it to exercise an influence wholly disproportionate to its real value, and to the amount of actual thought devoted to it. For though the number of persons who study it at all deeply is very small, the number of those who are compelled to get a certain acquaintance with its terminology and standpoint is very large. In former days it included the whole of the educated classes, and though nowadays the scientists and doctors have mostly emancipated themselves from its study, clerics, schoolmasters, and lawyers are still indoctrinated with it. In other words, the professional and literary classes are still pupils of the Formal logician, bad and unwilling pupils it may be, and ready to revolt, but unable to make their discontent effective. For Formal Logic does not rule by love, but by fear. Its pupils might learn to detest it, so long as they learnt to fear the Syllogism and all its works. *Oderint dum metuant.* And even if they desired to question its authority, there was no escape from it, and no alternative except in blind unreason. And though Irrationalism is often a relatively rational reaction against the excessive irrationality of Rationalism, it will not do as a permanent creed, because it deprives man of his chief weapon in fighting the cosmic chaos, namely, his reason.

The instinctive revolt against Formal Logic, therefore, was always hitherto predestined to failure. It found the whole vocabulary of knowledge moulded by Formalism and the whole technical language which literature had to use. There was no opposition to Formalism in Logic. The sciences were apathetic or indifferent. They had all either admitted the claim of Formal Logic to have accounted for their procedures, or been browbeaten into confessing their inferiority in rigour and cogency to the logical 'ideal.' They were, moreover, too busy with their own work to reflect upon their methods and to exhibit more than passing puzzlement when they found that these did not in fact conform to the logical models. Moreover, in the sciences, as in the whole academic world, the principle of authority is very strong. The specialists in each science expect to have their results accepted ; *cuique in sua arte credendum*, and so interscientific comity forbade the questioning of the results of Formal Logic. It was so much easier, politer, and more profitable, to mind one's own business.

It is only in quite recent times that this scientific equilibrium has been upset to the detriment of Formal Logic. Scientific education has been allowed to escape from its sway, less from design than from the apathy of logicians who thought they had exhausted the meaning of Science long ago and did not wish to be troubled with the complexities of so much new 'material' knowledge. A new science, moreover, has slowly risen into prominence, in the shape of Psychology, which has already exercised some influence on literature. And however anxiously psychologists might shrink from a conflict with 'Logic,' and restrict themselves to highly technical descriptions and very dull experiments, it could not in the long run remain hidden that the accounts they gave of the processes of thought were utterly discrepant from those traditionally presupposed by the logicians, and indeed in many points convicted them of obvious error. Hence the educational position of Formal Logic is, for the first time in two thousand years, seriously threatened. But it is still

immensely strong, for Formal Logic is established and endowed, and the mere fact that it is wrong and extensively known to be so, will not prevent it from continuing to be taught, unless a certain amount of social pressure is brought to bear upon Formal logicians.

§ 3. *The False Ideals of Formal Logic*

If error were harmless, it would not be worth avoiding or condemning. If the falsity of Formal Logic were merely 'theoretic,' it would excite no interest in any one. It is because of their practical effects that the false 'ideals' of Formal Logic are worthy of mention and, in any significant sense, false. That, however, the Formal ideal of knowledge has important and harmful practical effects may be seen by considering some of its chief corollaries.

(1) Formalism's 'ideal' of the motion of Thought is that it should be, not *free*, but *compulsory*. Even as a slave's evidence was not good in Roman Law unless it had been given under torture, so a conclusion is worthless in Formal Logic unless it has been *forced* upon the mind. 'Inference' is to be 'logically necessary,' all 'proof' is to be 'coercive.' Its aim is to terrorize, and not to attract. Truth is to be believed, not because it is desirable and good to believe, and better than error, but because it imposes itself by sheer force on a mind that 'cannot help' believing it, and because it can wring assent from a reluctant and tormented soul. Evidently this 'ideal' has educational affinities with the barbarism of the old disciplinary methods; but is it calculated to promote a *love* of truth?

(2) Its ideal of formal perfection is *Fixity*. Because in the perfect truth there can be no change, therefore change in a system of beliefs is symptomatic of its falsity, and the less we change our beliefs the better. Even if these inferences do not strictly follow from their premisses, they are yet extremely natural; and it is evident that they must serve to commend Formal Logic to the blindest and most intractable sort of conservatism.

(3) Its ideal of 'proof' is that it should proceed from and arrive at, *Certainty*. To ensure certainty it tries to avoid all *risk*, and to ignore all thinking which involves it. Until premisses have been discovered for a conclusion which are absolutely certain, all the reasoning is unsound, 'invalid,' and not worth considering. Merely probable conclusions are merely despicable. Probability may be the guide of life and the acme of science, but Formal Logic will not demean its ideal to take note of it. If certainty is unattainable, then so much the worse for Science and for Life: let the Logical Ideal break off all relations with them!

(4) Truth, being *absolute*, is true without regard to circumstances. If concrete 'cases' are always individual, and 'truth' in them is always relative to a particular context and a personal meaning, and if there is no way of preserving the integrity of absolute truth while continuing to apply it, why then the remedy is simple: let us *cease* to apply it! And if in reply it is urged that a truth which is not and cannot be applied becomes unmeaning, by all means let us abstract from meaning too! Our ideal is to be 'independent,' and is not meant to be relative to man and human uses!

Absence of meaning, however, must not be held to detract either from the absoluteness of the Ideal or from its authority over man. Indeed it would not be absolute if man were allowed any say in the matter, a voice and a vote in the making of truth. Man is not free to make truth, which is 'necessary' and 'eternal.' 'Necessity' is as evidently the tyrant's plea in logical as in political absolutism, and neither has any use for the freedom of human activity.

(5) The absolute system of immutable Truth is *one*. Not more than one view, therefore, can be true. You either have The Truth, or you have not. If you have it not, you are lost; if you have it, no one should dare to contradict you. You do right, therefore, to get angry with those who dispute The Truth. The Truth is yours, *nay, it is you*, if you have truly purged yourself of all

human feelings. *La vérité c'est moi*, the Formal logician can then proudly say.

These corollaries from Formal Logic are surely remarkable and distinctive enough. It would be strange if they had no practical effects upon the minds that entertain them and try to live up to them. Let us see, therefore, what effects may justly be attributed to them in Science, in Religion, and in social life.

§ 4. *Their Effects on Science*

It is clear that if, and so far as, Science allows itself to be impressed by the Formal ideals, its procedure must be seriously affected.

(1) The *Freedom* and attractiveness of scientific research must seem something inexplicable, abnormal, and monstrous. The pleasures of discovery ought to be forbidden to those who are the slaves, and not the masters, of truth.

(2) All existing systems of Science will be condemned by their lack of *fixity* and their systematic incompleteness. It will be unintelligible that Science should thrive on the constant alteration of its theories, and never condemn itself for its uncritical credulity in accepting as true to-day what its whole past predicts it will probably abandon as false to-morrow. In short, the *progressiveness* of actual science is Formally indefensible.

So (3) is its *Tentativeness* and *lack of certainty*, and readiness to *run the risk* of its fictions, postulates, and hypotheses. Its Formal offence will only be augmented by the inept defence that in scientific fact absolute certainty is quite unnecessary, that it is very easy and convenient to argue from assumptions provisionally taken as true, with the intention of testing them by their working, and that so the truth of premisses may be, and is, established empirically by the truth of their conclusions. For all this is only to abandon more explicitly the ideals of Formal demonstration and absolute truth. And the only thing that could be more atrocious than

this theoretic defection from the 'Ideal' is the claim (apparently well founded) to prosper without it in practice.

(4) The scientific readiness to learn from experience, to adjust rules to cases, to modify formulas as the facts seem to require, and generally to handle 'facts' and 'laws' with the utmost freedom, as if they were relative to each other and to human desires to control phenomena, must seem utterly repulsive to Formal Logic. It must protest that though Science professes to pride herself on her recognition of universal 'law,' it is not really law-abiding in a Formal way. For not only does every science claim, and exercise, the right to make laws in an autonomous way, but in so doing it consults merely its momentary convenience, and respects neither the conventions of Formal consistency, nor even the convenience of other sciences nor its own past. It is continually revising its laws, and changes them unblushingly; and this is to import democracy into Science, or rather anarchism.

(5) If Truth is Formally *one*, and there can Formally be but one true theory of anything, it is clear that it leaves no room either for a plurality of sciences or for a plurality of theories within each science. Yet most of the sciences would fight hard (and justly) for their independence. The sciences demand, moreover, the right to make, and to use, a plurality of hypotheses, and to test them concurrently, instead of proving one to be absolutely false before taking up and testing another. And they praise, and largely practise, a Freedom of Thought, which involves difference of opinion, and a plurality of theories which are actually held to be true, and are treated with tolerance if they promise to promote the growth of the science.

On the whole, then, it is clear that both the formal character and the best practice of Science would be profoundly altered if it had to adapt itself to the logical 'ideal.' It is not to be denied, however, that in the past Science *has* attempted so to adapt itself, and claimed infallibility, and fixity, and exhibited dogmatism and

intolerance. But was it in that past that Science was most progressive and successful? And was it not in that past, during the long darkness and sterility of the Middle Ages, that Formal Logic ruled unquestioned? Is not Science now entitled to regard all its accommodations to Formal Logic as blunders and impediments to scientific progress?

§ 5. *Their Effects on Religion*

It is not too much to say that a large proportion of the best human thought has become profoundly alienated from Religion, thanks to the malign influence of Formal Logic.

This influence has led astray both the advocates and the adversaries of Religion, by implanting in them a common Rationalism, which fatally misapprehended the true function and vital value of Religion. And this Rationalism had its roots in nothing else than Formal Logic.

Rationalism has beguiled the opponents of Religion to criticize religions as purely rational systems of beliefs, to be judged by rigid canons of formal consistency, and to be condemned for the moral deficiencies and atrocities to which the attempts to carry out religiously the requirements of Formal Logic committed them. They argued that because the systems of theology which rationalistic theologians had compiled were not consistent, therefore all religions were false, and there was neither truth nor use in them; they did not perceive that even the poorest religion is more than an exercise in Formal Logic, and that no religion can be consistent so long as they all try to adapt themselves to Formal ideals which ignore and condemn their essential meaning. Or again, the humaner rationalists argued that because theological dogmatism had driven the Churches into appalling intolerance and abominable persecutions, therefore all religions were bad; and here too their case was rationalistically unanswerable. For their theological

opponents could only have replied with a *tu quoque*, to the effect that since admittedly Truth was one, and absolute, and certain, and fixed, and coercive, *all* were in duty bound to act upon their beliefs and to *force* The Truth on unbelievers. 'Instead of bleating, therefore, about the barbarism of burning heretics,' a clear-headed Inquisitor with a firm grasp of Formal Logic might reply, 'you too should have the courage of your convictions and retaliate by assassinating bishops at every convenient opportunity.' These, in fact, are still essentially the lines on which religious controversy is conducted on the Continent, and it is only the happy illogicality of the Anglo-Saxon mind which has shrunk from applying in practice the intolerant conclusions to which the theories of both sides inevitably led.

But anti-clericalism is after all a secondary phenomenon, and a mild reaction against the far more serious outrages upon the freedom of human thought and action and the dictates of common humanity, which have been perpetrated for centuries, in the name of Religion, *at the behest of Formal Logic.* It is piteous to trace how step by step Religion has been sacrificed and mangled by theologians who honestly believed the lessons they had all learnt from Formal Logic, and preferred its letter to the spirit of their faith.

(1) To conceive The Truth as compulsory and coercive is in principle to authorize every form and measure of persecution. It makes the sword and the stake the proper instruments for effecting religious conversions. This inference from Formal Logic easily prevailed even over the most explicit tenets of the religions themselves. However ardently their founders might advocate reasoning and persuasion and insist on the beauty and value of their beliefs, their followers thought it their sacred duty to practise persecution. Why? Whence came this departure from the religious spirit? Surely to a large extent because they had been taught to believe that men *must* be brought to embrace 'The Truth,' by compulsion *for choice*, seeing that *all* truth was *coercive.* Formal Logic

thus underlies all that has been falsely called '*religious*' persecution.

(2) What insuperable obstacles the Formal ideal of *Fixity* has placed in the path of religious progress and reform is too notorious to be dwelt on. But it may be pointed out that here again an intrusive inference from Formal Logic has prevailed over the ideas involved in the substance of the religions themselves. No religions originally show themselves so obsessed with the idea of fixity; at their first appearance they do not conceive themselves as final, but all look forward to Messiahs, Second Comings, Mahdis, and other forms of future consummation. Their formulation into rigid Creeds which must be believed in every syllable and on no account be revised, is a phenomenon which comes later, when logically trained theologians have got the religious movement under control.

How profoundly irreligious this change is, appears from the negation of the notion of *revelation* which it involves. For is not *progressiveness* implied in the very notion of a 'revelation'? Can the divine revealing of a *new* truth be conceived to leave a mind that imbibes it unaltered and unfortified, and in no better posture for religious *growth*? A revelation that carries with it no spiritual enlightenment, that forms no stimulus to spiritual progress, but merely fixes a *status quo*, is a futility and in no credible sense a revelation at all. It reveals nothing but the inveterate antagonism between Formal Logic and Progress.

(3) The Formal ideal of *Certainty* has rendered *Doubt* a capital offence in theological opinion, and inflicted unspeakable torments on countless generations of honest doubters. But it is clear that *intellectually* doubt is ineradicable. No religion has ever been such, or in all probability can ever be such, that its certainty is absolute, that its evidence is intellectually complete, and that to doubt it is impossible. To demand a religion, therefore, that can refute all doubts is to demand an impossibility, and in fact a religion that will refute itself. For the

more strenuously it tries to satisfy this rationalistic demand, the more pitiably it exposes its formal weakness.

But the demand for a suppression of Doubt is also a demand for a religion divorced from Life and Science. For in real thinking Doubt is the stimulus to thought, all real questions imply real doubt about the answer, and every 'truth' gets its meaning from its relation to a doubt.[1] In the growth of scientific truth this relation to a doubt is very manifest; it is the reality of the question which evokes and tests the answer. In action also we find that its freedom consists in its resolution of alternatives and decision of questions. Both science and action, therefore, exhibit to us the notion of a *practical certainty*, which springs from, and is relative to, doubts. Why, then, should Religion sever its nature from those of Life and Science, and eschew the methods by which they flourish exceedingly? If Doubt is to be exterminated, it can be only by suppressing thought. All religions have been beguiled by Formal Logic into attempting this fatal policy, though not all have entirely succeeded in producing thereby religious atrophy and moral revolt.

And yet Formal Logic itself should have warned them that by their very fidelity to the Formal ideal they were committing both a religious and a formal inconsequence, and disrupting their own consistency. No religion is a product of pure ratiocination. Religions always contain much that is super-rational, if 'reason' be taken in its narrowest (and most unreasonable) sense, as well as a good deal that looks irrational. It is therefore easy for the rationalist to lump all the non-rational elements together, and to condemn the whole. Hence nothing is more certain to produce 'self-contradiction' in the fabric of a faith than the attempt to convert it into an absolutely certain 'creed,' to be adequately apprehended by bare reason. For this is to eliminate its character as a '*faith*,' which, nevertheless, the religions all (inconsistently) regard as essential. Now 'faith' cannot be 'knowledge.' How-

[1] This is the great (though simple) discovery which has been made (independently) by John Dewey and Alfred Sidgwick.

ever superior we may find it spiritually, it is inferior to knowledge in the point of intellectual certainty. We have faith in what we do *not* 'know for certain.' It is precisely because there is so little (if anything) that we can know for certain, that there is so much need for faith, which is 'the support of our hopes,' of the hopes we need to *live*.[1] If, then, religious knowledge has to be absolutely certain, it leaves no room for faith. Is 'faith,' then, to be excluded merely because it has affinities with Doubt? Psychology assures us that in point of present fact the religious life is intimately related to the pangs of doubt and the distresses of disbelief; if these things lie at the roots of actual belief, why disavow them in theology? It is not essential to *Religion* that its 'truth' should be represented as coercive, absolute, and abhorrent; it is only the needs of Formal Logic, and not those of the religious life, that constrain theology to make a *sine qua non* of *Certainty* and a crime of *Doubt*.

(4) '*Heresy*' is another theological crime, fabricated wholly out of Formal Logic. For 'heresy' is merely thinking and *choosing* for oneself, and taking the responsibility for one's opinions, instead of taking them mechanically at second-hand. It is, in short, personalism in Religion, and seems intrinsically harmless. What, then, is the *religious* objection to it? Is it merely the fear that if freedom of thought is allowed, no two people will freely and voluntarily *agree* upon the religious value of any belief, and that therefore every organized religion would fall to pieces? That, surely, is a fear no believer in the truth of any religion dare avow. Do not the threats against 'heretics,' then, of hell-fire and incineration proceed, not from Religion, but from a Formal Logic that cannot allow individual thinking about individual cases? Nor is it hard to understand why a logic which has allowed no reference to the fact that every judgment implies a choice, should prohibit choices in all the subjects it can control.

[1] *Not* 'the *substance* of things hoped for,' as the translators have shamefully intellectualized St. Paul.

(5) The intolerant conviction that there is only one true religion and that the rest are worthless, is a direct corollary from the Formal belief in the absolute unity of truth. It is not a corollary from anything else, and neither morally a counsel of perfection, nor diplomatically a counsel of prudence. The mischief it has wrought has been incalculable. And, after all, the bloodshed it has instigated has been all in vain. History has declared against intolerance, and in practice we have all to confess nowadays that there is truth beyond the limits of the beliefs we hold, because they seem to us the truest.

Surely, then, Formal Logic, long *ancilla theologiae* in name alone, has completely mastered her mistress, and given Religion good reason to claim compensation for the evil it has wrought. Religion, on the other hand, may well expect a revival from the demise of Formal Logic, if it could happily be brought about.

§ 6. *Their Effects on Mankind*

Our study of the educational, scientific, and religious effects of Formal Logic has to a large extent rendered superfluous by anticipation the inquiry into the social effects which may reasonably be ascribed to the vogue of Formal Logic. Its fruits are dogmatism, intolerance, pedantry and contentiousness, timidity of thought, and a cowardly avoidance of risks. It will probably be admitted that these tendencies are not unmitigated blessings socially, and far too common. But a word or two of explanation may be added.

The dogmatic temper is a widespread social curse. But it is not solely engendered by Formal Logic. It is often congenital, and it is, in virtue of his office, the besetting sin of the teacher. But it can hardly be doubted that the encouragement and justification it seems to draw from Formalism greatly tend to aggravate the evil. A habit, on the other hand, of remembering that thought is about real questions, and springs from real doubts, would be a potent check upon dogmatism everywhere.

Intolerance, again, is to some extent an innate tendency, though it is mostly aggravated by bad manners. There is, however, a real use, socially, for a limited amount of it. For it is evident that up to a point it welds society together, and facilitates common action. A gregarious creature like man *must* show himself somewhat sensitive to the ways of his fellows, and must put some check on the waywardness of dissenters. He has consequently grown a certain instinct of intolerance, which insists on social conformity. But the thing is usually overdone, and we mostly tend to excessive conventionality and snobbishness. Moreover, beyond a certain point, the intolerant craving for uniformity overreaches itself. It breeds contentions and destroys social harmony and the interest of human variety. Even this, however, would not matter so much, if social pressure contented itself with securing community of action and left opinions free. But the intolerant temper, when egged on by the Formal conceptions of truth, is wont to feel that it is theoretically justified, and to exercise itself especially upon matters of opinion, most of which are really doubtful, and should be treated accordingly. It does not perceive that socially also freedom of thought is a great safety-valve, and that so long as society can secure the requisite amounts of agreement in action, it need not care what variety of reasons men give for them.

Are not the *pedantic* and the *bureaucratic* spirit, moreover, direct descendants of the dogmatic? Are they not both forms of faith in the absoluteness and all-sufficiency of *Rules*, without regard to their concrete applications to actual cases? And hitherto the men of rules (dogmatists, pedants, bureaucrats), who look to rules to exempt them from the responsibilities of *acting*, have always been supported by the authority of Logic in suppressing the revolts of the men of action, who live by deciding the particular case aright (whether it be a case of law, or of conscience, the making of an observation, or the undertaking of an experiment), of the artists, who must see beauty in some sensuous embodiment, and not in any

abstract schematism (to which Plato would divert their gaze), and of the historians, who have to trace the unique procession of events and find that the 'philosophy of history' merely invites them to falsify their facts. All these have always had ample experience of the inadequacy of rules, and of the need of discrimination and discretion in applying them. But their protests against the evils of pedantry and officialism could always be met by the triumphant reply: 'However badly our rules may seem to work out in your case, you cannot at any rate deny that *theoretically* we are right.' They could not retort: 'No, theoretically you are *wrong*. Your inapplicable rules are wholly destitute of meaning. The difficulties of applying rules, which you despise as unworthy of the attention of the truly philosophic eye, are the real difficulties of whosoever has to perceive a fact or to decide upon an act. You have made them irrelevant to your "science," and have made your rules "absolutely" true; but only by abstracting from application altogether. Your rules apply to nothing on earth, and how on earth men contrive to reason, you cannot understand. But what right have your rules to presuppose what can never be known for certain in advance, viz. that the nature of the case is *not* to entail a revision of the rule? And the more you boast that your conclusions are "formally valid," the less surprised we are to find that they are *not* "really true."'

But common-sense and experience, even though backed by satire, were bound to fight in vain against the mechanical tyranny of rules, so long as it was regarded as a legitimate simplification of 'Logic' to abstract from the problem of application, and to argue about verbal symbols and not about real meanings.

By discouraging intellectual enterprise and inducing a reluctance to take risks, the Formal ideals also do much social harm in another way. For they impede our adaptation to the nature of a world which, despite all our ingenuity and forethought, remains wild and incalculable, so that everything in it, from agriculture, which is a

speculation, to marriage, which is a lottery, demands from us the taking of risks. Society, therefore, needs to *encourage* activity and boldness, instead of holding up to the human mind the irrelevant model of a static truth from which all risk has been expunged. It suffers chronically from absence of originality and lack of enterprise in its members, especially in the discovery of truth. For it has been customary to represent genuine truth as persisting immutably from time immemorial: new truth, therefore, has always been quoted at a heavy discount; the whole apparatus of Logic has been directed to making the new seem old, and to putting a premium on senilities. So not even the poets, to whom a certain license is accorded, have ventured to preach the salutary doctrine that 'none but the brave deserve the *true*' as the *fair*, and that terrestrial truth lasts about as long as terrestrial beauty, but is not the less precious for that!

§ 7. *Conclusion*

Our task is accomplished. We have struggled perseveringly to clear up the real nature of Formal Logic, its real motives and its actual effects. But though Formal Logic has ceased to be a problem for science, it continues to be one for society. The practical question of what is to be done in consequence remains unsolved, and a difficulty. It is, however, a difficulty for the statesman and the moralist, nay, even for the scientist and the theologian, rather than for us. For it is their duty to devise a practical policy for protecting themselves from misrepresentation and the people from deception. To us, as logicians, it must suffice to have set our house in order, and to have cleared the ground for a new Logic that will not disdain to reflect upon real thinking, nor confine itself to fictions and falsifications.

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